The Chemical Age

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Notes and Comments

Chaos in Chemistry

As it includes his presidential address on the "Unification of the Chemical Profession," delivered by Professor Morgan at the annual meeting of the Chemical Society, the April number of the Society's Journal is of unusual interest; the more as it is also relieved by a speaking photograph and an all too short, rather stiff notice of the late Professor John Millar Thompson, who was for many years a faithful and devoted servant of the Society and a man of a type now almost unknown. Otherwise, the Journal, in large part, is a forbidding mass of trivial matter, set out with little attempt to attract the reader. Recent rumblings from the provinces are clearly justified. Indeed, the picture Professor Morgan draws of the present state of disunion is alarming. Incidentally, he specially deprecates the proposed further limitation of the Society's functions by the establishment of a new publication largely under the control of the Faraday Society. He pleads for one all-embracing society, advocating the return to the paternal fold of the many prodigal sons now afield.

The front cover page, giving particulars of the new Council, is speaking proof that chemists cannot think and vote otherwise than in terms of the narrowest scholastic parochialism. With the sole exception of Mr. Davidson Pratt, the governing body is entirely academic: not one of its members is even distantly connected with industry; all are—just professors. Some may remember Professor Armstrong, last year, reading out a list of the Council when he joined the Society in 1870; it was full of names of men of industrial and social importance. A few years later, the late Sir Henry Roscoe, unfortunately, was led to turn traitor and to head the movement for the formation of the Society of Chemical Industry. The late Sir Edward Frankland, in like manner, became leader in founding the Institute. A race set in which every year has carried chemists more and more into separate camps, so that now no breadth of knowledge or outlook is left in them. As a consequence, the chemist no longer has the slightest general authority even in his own home; in fact, he has neither house nor collective weight in the Councils of the nation. Meanwhile, the Royal Society is also allowing itself to fall into scientific and social insignificance. The Fellows at large are kept in close subjection by an old-world autocratic system of secretarial dominance. The situation is critical in all fields. There is grave danger that unless protective measures be taken, without much further delay, the body scientific may sink into a position of social insignificance. Workers are too divided, too little organised to exercise any collective influence; soon even heavy water will not keep chemistry afloat.

The Call to Industry to Lead

THERE would seem to be but one solution of the problem. Not only the social position of our science but the future of industry is at stake; not the chemical industry alone but of industry in general, chemistry being a root science which no modern industry can do without. In days gone by, the prominent industrialists were regular front-benchers at the Chemical Society. The academic element is equally absent from the meetings of the Society of Chemical Industry, in its various groups. Industrialists cannot possibly stomach the stitled twaddle heard at the meetings of the parent Society and published in its Journal; an extreme example, dealing with heavy water, disfigures the April issue. In a great industrial centre like Manchester, the attempt to bring the academic element into touch with the industrial has been a signal failure. The call is upon industrial leaders to realise that the position of industry cannot be maintained so long as there is no effective collective organisation of affairs chemical in general. So-called research is rendering true education impossible—in fact, it is fast killing the goose that is to lay the eggs, for the training is so narrow. No amount of argument will solve the problem. Industry has the power to compel, by declining to make further academic grants, unless unification of all the forces be effected. The present situation having been created by the ill-considered separation of the industrial from the academic element, it now rests with industry to reunite the scattered forces. Only in this way will it be able to save itself.

Gas Industry Rationalisation

SIR DAVID MILNE-WATSON described last week's meeting of the South Eastern Gas Corporation as a historic occasion in that the first year's trading results of an organisation entirely novel to the industry were brought under review. Amalgamations have been comparatively common in the gas industry during the last few years, but the South Eastern Corporation is a pioneer without exact precedent. A large part of a county has been placed under flexible, centralised con-

trol for the production and distribution of gas, and while the Corporation is admittedly a modest experiment in regional planning it is for that very reason the better worth studying. Those responsible for the consolidation are extending to a number of relatively small and scattered undertakings advantages in bulk purchase of stores and raw materials, in standardisation and in technical information which could only be at the disposal of a much larger unit. The undertakings which have come into the scheme are controlled by progressive boards and the " men on the spot " retain their executive authority, backed by allies that no local undertaking, however well run, could possibly enjoy.

The corporation is a development towards a rationalised gas industry which is being conducted on a strictly practical businesslike basis. It has its eyes on the future, but not so fixedly as to forget that business has to be done in the present. Sir David pointed out that the diversity and growth in the application of gas for industrial purposes are decidedly encouraging. As industry tends to spread to the south of England it is clearly important that the latest expert knowledge should be at the disposal of the undertakings in the areas affected. The new corporation covers such an area, and it has already found the value of being able to call upon the industrial section of the Gas Light and Coke Company. The companies embraced in the corporation serve an aggregate area of 720 square miles, having a total population of 500,000, and every company in the group is at present showing an increased production of gas.

Commercial Heavy Water

COMMERCIAL manufacture of "heavy water" is being undertaken at Billingham. In the past it has been usual for long decades to elapse between discovery and commercialisation. The rapidity with which a substance, discovered as it were only yesterday, is being placed on the market is a tribute to the alertness with which the affairs of I.C.I. are being conducted. The price is to be not less than 40s. per gram of 30 per cent. purity, but demand and experience will soon lower this. Before long it is hoped to produce heavy water having a purity approaching 100 per cent. Heavy water reacts more slowly than normal water, it serves as a convenient source of heavy hydrogen required in atomic research, and it has important physiological characteristics. Tobacco seeds, for example, will not sprout in nearly pure heavy water and grow only half as fast in water of 50 per cent. purity as in normal water. Already it has been found to be toxic to certain of the lower forms of life, such as tadpoles; what then will be its effect upon disease germs and particularly upon cancer? We understand that experiments are to be undertaken in this latter direction now that the substance is obtainable commercially. It would be a triumph indeed if this latest discovery of chemistry should pave the way to the elimination of the scourge of the twentieth century.

The potentialities do not stop there. Heavy water is a destructive agent. What of " light water "? It is worth investigating whether it may not possess some special properties. Possibly it may give to the skin a peculiar radiance. The ladies of ancient days who desired to keep their complexions white and perfect were wont to bathe in milk. May we not imagine that a bath in " light water " would confer some special loveliness? It hardly seems necessary in this present age of beauty parlours to investigate whether this be so; or to prove its efficacy. All that is necessary is to announce that it is so, and the sale of light water via the beauty parlours will be such that the entire resources of Billingham will not be sufficient to provide for the demand. At the worst the use of a little wholesome water for washing, in place of the present vogue in cosmetics and powders, cannot be other than beneficial. Heavy water may be obtained in fairly concentrated form as a residue on distillation of normal water. The best method of manufacture, however, appears to be electrical, the method in use at Billingham.

Favourable Prospects in Palestine

THE operations of extracting potash from the water of the Dead Sea appear to have reached a position in which their prospects can be regarded as very favourable. The third annual report of the managing director of Palestine Potash, Ltd., states that the first year of the company's activities was devoted entirely to the construction of pans, erection of plant and buildings. Only a few thousand tons of crude potash salts (carnallite) were produced in the pans by solar evaporation. In the second year the temporary pumping station and pipe line conducting sea water into the pans and the temporary power house were replaced by a permanent deep sea pipe line of 30 in. diameter and 2,500 ft. in length, laid on the bottom of the sea, and a permanent pumping station and power house. The erection of the bromine and potash factories was brought to the stage when production on a small scale could be started. The first bromine was produced and despatched in February, 1931, and the first few hundred tons of potash in December, 1931. The period under review was a year of consolidation and further development of evaporation pans and plant. The pan area of 150 acres in 1930, which was increased to 500 acres in 1931, was further extended to 700 acres in 1932. A second bromine plant of twice the size of the first one was installed and put into operation. The capacity of the bromine factory was thus brought to a daily production of three tons of refined bromine. The building of the potash factory was completed in the second half of the year and some additional apparatus installed.

Over 100,000 tons of crude potash salts (carnallite) were precipitated in the pans by solar evaporation and harvested. Both the potash and bromine factories were working three shifts throughout the whole year and the total production was disposed of, *viz.*, bromine mostly in the British market, and potash in various world markets. Experience was gained in the course of the year in the harvesting of large quantities of carnallite from the evaporation pans, the refining of crude potash salts into a high grade product and the manufacture and refining of bromine. Some 430 workmen, Jews and Arabs—the latter in equal proportions from Palestine and Trans-Jordan—were in the company's employment by the end of 1932. They were engaged in production as well as construction work connected with the further extension of plant. Housing accommodation, including water and electric light, is provided by the company for the workmen free of charge.

British Chemical and Dyestuffs Traders' Association

Mr. Victor Blagden Re-elected President

THE eleventh annual general meeting of the British Chemical and Dyestuffs Traders' Association was held at the Howard Hotel, Norfolk Street, London, on Wednesday afternoon, when Mr. Victor Blagden was re-elected president for the ensuing year. The business meeting was, as usual, preceded by a trade luncheon, presided over jointly by Mr. Blagden and Mr. H. Gilliat, the chairman.

Mr. A. W. EDWARDS proposed the toast of the Association, coupled with the name of the president. The Association, he said, had been through dark and difficult times, and necessarily so, for it was founded largely for defensive purposes and therefore had not had opportunities for spectacular efforts. It was very much to the credit of the officers and executive of the Association that the dark patches had been so triumphantly surmounted. The members were greatly indebted to Mr. Victor Blagden for his interest, which had been unbroken during the whole life of the Association, first as chairman and later as president. The fact that his name had been connected with the organisation had been of immense help and had added lustre and prestige to the Association. Mr. Edwards congratulated Mr. Blagden upon his recent appointment as high sheriff for London, an office which entailed the questionable privilege of witnessing the execution of criminals.

Hampered by Restrictions

Mr. BLAGDEN, responding to the toast, remarked that when he discovered the extent of his responsibilities as sheriff he promptly appointed three under-sheriffs to assist him. He highly appreciated the honour of being president of the Association, and if there was anything he could do to further its interests he was only too glad to serve them. Since they met there twelve months ago there had been a distinct improvement in trade, in which he hoped they had all shared. At any rate there was a reduction of sixpence in income tax, which affected them all. It was gratifying to see such a good report issued by Imperial Chemical Industries, Ltd., which gave a clear indication of the improved position generally.

Unfortunately, as regards the future, currency restrictions and increased tariffs were hampering trade considerably, and at present there did not appear to be any prospect of those obstacles being removed. The merchants' lot, which was to open up new markets, was a difficult one. Unless something was done quickly to stabilise currencies, then their trade, both export and import, must fall away again. The vast experiment that was being tried out in the United States created a factor of great uncertainty, for it was impossible to foresee how it was going to work out during the next few months. Then the re-armament of the European countries on a considerable scale gave rise to no small apprehension and seemed to indicate that all efforts made towards a peaceful settlement of international affairs were futile.

Association Going Strong

The Association was going strong. Its membership was maintained and its usefulness to various directions continued. It was obvious that in these days they must combine in such an association to protect their interests and thereby achieve results which they could not achieve individually. The merchant was needed to-day in commerce as much as ever, and though many efforts had been made to dislodge him he still survived, because he fulfilled a useful purpose and was a necessary link in the chain of distribution.

They were hampered in many ways to-day through quotas, licences and other regulations and restrictions, which for the time being must be put up with, but he thought the customs authorities made the importer's task unnecessarily difficult by demanding deposits far in excess of the amount required and often taking months to refund the amounts which had been overpaid.

The Association had been fortunate in having Mr. Gilliat as chairman, and it was a pleasure to announce that he had consented to continue in office for another year, in spite of having to make so many journeys from Leeds to London. Mr. Paige, their secretary, had again done excellent work and had the interests of the Association very much at heart.

The Annual Meeting

At the annual meeting of the Association, the following officers were elected to serve during the ensuing year:—President, Mr. Victor Blagden; vice-presidents, Mr. Fredk. T. T. Reynolds and Mr. A. F. Butler; chairman, Mr. Harold Gilliat (Leeds); vice-chairman, Mr. H. A. Berens; hon. treasurer, Mr. A. E. Reed, hon. auditor, Mr. A. Hughes, executive council, Mr. W. Beckley (Chas. Zimmermann and Co., Ltd., London), Mr. O. F. C. Bromfield, Mr. J. Brown (Brown and Forth, Ltd., London), and Mr. W. Mann (Produce Merchants, Ltd., London).

Mr. H. GILLIAT, chairman, in the course of his report on the activities of the Association during the past twelve months, congratulated the members on the soundness of the financial position as revealed by the audited accounts. Mr. Victor Blagden, their president, devoted much time and thought year after year to promoting the interests of the Association. Of the two vice-presidents, Mr. Reynolds (Manchester) was unable to take an active part, but continued his interest in the welfare of the Association, while Mr. Butler continued to work hard and his enthusiasm was unceasing. The Association was fortunate in having such an enthusiastic worker as Mr. H. A. Berens, the vice-chairman, while the balance sheet reflected the satisfactory manner in which Mr. A. E. Reed had performed the duties of hon. treasurer. Owing to the expiration of the lease of the offices at Fenchurch Street, the Council decided that the time had arrived to remove to more suitable accommodation, and the headquarters were now comfortably settled in the new offices in Lloyds Avenue.

The Value of the Association

The services of the Association had been in constant demand throughout the year, and the members had again enjoyed efficient service. The facilities offered to individual members covered a wide field. Reliable information on matters relating to duties and restrictions was furnished without delay and the work of expediting the clearance through customs of goods delayed continued, while members were circularised on many matters of general interest. This routine work was of great benefit to members and there were many occasions when much time and hindrance could be saved by consulting the Association. It was able to render valuable services in many ways and all documents and business matters were treated by the staff as confidential.

The other side of its activities concerned matters of general interest that called for a good deal of thought and attention. These activities of the Association were more or less unseen, but he could assure them that the great bulk of the time of the executive council was taken up with negotiations and arrangements with the authorities in the interests of merchants. The executive continued to enjoy the confidence of Government Departments and official bodies generally and the views of the Association were always sought on matters affecting the chemical and dyestuffs trades.

Key Industry Duties

The operation of the Key Industry Duties still received a good deal of attention. Exemption Orders continued to operate for a number of products not manufactured within the Empire and a list of exemptions was furnished to members annually. He believed there were quite a number of chemicals that could be properly added to the list and members were invited to consult the Association as to how to proceed in making applications for exemption orders in respect of any products in which they are interested. Chemical traders knew the advantage of a drawback system in its application to goods liable to Key Industry Duty and he

could not find any sound reason why such facilities should not be generally extended to all imported goods. It would surely give much-needed assistance to the entrepot trade which had always been a great asset to this country.

General *ad valorem* duty matters had come in for a good deal of attention and there was undoubtedly room for much improvement in the administration of the Import Duties Act. Traders throughout the country had felt the pin-pricks of officialdom and in spite of an apparent increase in the staffs of official departments delay remained the chief hindrance to the proper conduct of business. Although the Association had been able to call attention to one or two outstanding instances, the delay in the settlement of even small matters of dispute was still unsatisfactory. So long as *ad valorem* duties continued to be the main basis of the tariff system, the value on which duty was assessed was bound to be the subject of many disputes, and it was worthy of note that the executive council was actively engaged in delicate negotiations on the subject of value for duty purposes of certain classes of importations.

It was unfortunate that the Customs' interpretation of some of the Orders issued by the Treasury appeared to be inconsistent with the recommendations of the Import Duties Advisory Committee. Obviously this state of affairs could be avoided if the Advisory Committee would give more specific details of the materials intended to be covered by its recommendations. The Advisory Committee was always willing to consider such cases and to recommend an amendment if the case is justified.

The New Dyestuffs Act

The Dyestuffs Act had, with certain modifications, been made a permanent piece of legislation. It had been recognised that no duty should be payable on dyestuffs for which licences were granted. There were many dyestuffs intermediates that required the same consideration and no doubt these would in due course be a matter of investigation.

The development of road transport had provided the chemical trade with wider facilities for the carriage of chemicals, and without desiring to enter into a controversy as to the benefits of either road or rail transport Mr. Gilliat ventured to hope that the needs of the chemical trade would be recognised when regulations for the carriage of chemicals were being drafted. Undoubtedly regulations for the carriage of dangerous goods by road transport were much needed, but they did not wish to find themselves placed entirely in the hands of the railway companies, which had in some cases refused to accept certain traffic at company's risk. The Association was watching the matter carefully and a copy of the draft regulations, when issued by the Home Office, would be submitted to the executive council.

Unity in the Chemical Trade

In reviewing the activities of the Association over a number of years it was satisfactory to note that its membership had been most consistent and he ventured to say that there was more unity in the chemical trade than in any other trade in the country. This was as it should be but it must not be overlooked that, but for the existence of the Association, the number of old-established chemical merchants would long ago have been reduced to a minimum. The merchants in this country laboured under many difficulties and these tended to increase year by year, and therefore the strength of the Association is a matter of interest to them all, and efforts should be made to increase the membership to the greatest possible extent.

Members themselves could frequently suggest new facilities that the Association might provide. Any suggestions submitted would receive the full consideration of the executive council. As an instance, he mentioned the question of credit now taken by many buyers of chemicals. He considered that normal monthly terms, namely, all goods invoiced in one month to be paid for during the following month, were sufficiently generous, but it was now found that certain firms were taking, without so much as asking permission to do so, a clear month or even quarterly credit. The merchants could not take the same credit with their suppliers, and the buyer was, therefore, using them as his bankers without paying for the service.

Mr. Gilliat expressed the thanks of the executive council and himself to Mr. F. G. W. Paige for his excellent work during the past year, and especially for the help he had always given him as chairman. He had followed in Mr. Bromfield's footsteps and in his dealings with Government departments, he received the same attention and consideration as Mr. Bromfield enjoyed, and that, he believed, is not exceeded by the representative of any other merchants' organisation in the United Kingdom. The report concluded with an expression of thanks to the president and the members of the executive council.

Ammonia Plant Explosion

Inquest Disclosures

EVIDENCE that a bursting disc gave way at a pressure lower than it was intended to deal with and that the victims were "hit by the coincidence of two misfortunes," was given at the resumed inquest on May 5, concerning the eleven victims of the explosion at the ammonia refrigerating plant of Imperial Chemical Industries, Ltd., Billingham, on April 18.

These men were working on the ammonia plant when they were overcome by a sudden escape of ammonia gas; three were killed outright, and the others in jumping for safety received fatal injuries.

William Charles Sexton, process foreman, of Imperial Avenue, Norton, said that in ten minutes just before the explosion the suction pressure at the ammonia pre-compressor rose from 6 lb. to 15 lb. He instructed a man to shut off the suction, and he had gone to do so when the disc "blew."

Thomas Conrad Robinson, a clerk engineer, of Station Road, Norton, said that the sole cause of the accident was that the bursting disc gave way at a pressure at which it was never anticipated it would give way. It had been tested at 30 lb., and on the day of the accident it gave way at 20 lb.

Henry John Thurlay, chemist and technical adviser of the plant, asked by Mr. C. B. Fenwick, representing Imperial Chemical Industries, if it ever entered into anybody's calculations that even if this bursting disc did go there would be such a violent boiling that liquid ammonia would get out, replied, "No."

Mr. Fenwick: What steps have now been taken by the company?—We propose to put large pipes to the ends of the bursting discs and lead them away to separate any liquid ammonia.

Mr. Fenwick: The disastrous consequences of this accident were caused by the fact that liquid ammonia was thrown right up these pipes?—Yes. And they could not have been foreseen?—No. And the unfortunate victims have been hit by the coincidence of two misfortunes?—Yes.

Mr. W. B. Lauder, H.M. Superintending Inspector of Factories, suggested that precautions might have been taken for conveying the gas away when the disc burst, and that tests of the disc should have been made in exactly similar conditions to those on the plant. Mr. Fenwick said that Mr. Lauder's remarks contained interesting and constructive suggestions for the future, but they were an admirable demonstration of how easy it was to be wise after the event.

The Deputy Coroner (Mr Norman Graham) said that if any verdict other than accidental death was returned they had to find that somebody had been negligent. Such a view would have to be supported by a charge of manslaughter against somebody, but the evidence would not support anything of the sort.

IMPROVEMENT in general construction operations, which previously had been severely depressed, caused a considerable pick-up in German sales of lithopone in the domestic market during 1933. Sales have continued brisk this year, and the market outlook is improved by the organisation of all producers in the national sales cartel, the Lithopone-Lontor G.m.b.H., of Cologne, and the prolongation of the cartel's life to 1937, thus insuring controlled market conditions for a period of years in the future. Exports of lithopone likewise expanded in 1933 to 13,053 metric tons, from 11,890 in 1932, but were still considerably under exports of more than 18,000 tons in both 1931 and 1930.

Steam in Chemical Works

Some Factors Affecting its Economic Use

THE economic use of steam at chemical works was discussed at a joint meeting of the Institute of Chemical Engineers with the Institute of Fuel and the Chemical Engineering Group, on April 18, the joint authors of the paper being Mr. W. F. Carey, M.Eng., and Mr. A. H. Waring, A.M.I.Mech.E.

IF the value of steam be defined as (cost of water + cost of steam energy) consumers will be debited with charges for the water and energy received, but they will be credited by the boilers with the value of condensate which they return. They will have presumably rejected the energy at the lowest sink temperature which is economic; consumers who reject energy as well as water to further consumers will, of course, receive a credit for both energy and water. So far as engines go this system is, therefore, both logical and workable.

The case of evaporators and heaters, however, is not at first sight so simple. The usual system is to-arrange high pressure engines to exhaust as far as possible to low pressure heaters and evaporators. This reduces the total condenser surface necessary in the works and, in general, low pressure heating and evaporation are cheaper than high pressure. The engine exhaust in such a system will often be saturated or slightly superheated.

Evaporation and Heating

When steam is used for evaporation or heating, the latent heat is degraded by overcoming the temperature difference between the stages of evaporation t . In the following stage it is available at a lower saturation pressure. In fact, if we have a multi-stage evaporation system in which ΔT is the temperature difference between stages, the number of times which the steam can be used is

$$\frac{\text{Total temperature drop available in saturated range}}{\Delta T}$$

Now, in the ordinary temperature range of low pressure evaporation, say, 30°–120° C., the heat required to evaporate 1 ton of water will vary only a few per cent. in general. In fact, it is nearly true to say that under ideal conditions the value of steam as a heating agent is proportional to the number of times which it can be used in an evaporator. But as the number of stages of evaporation is proportional to the available energy, this means that available energy is a good commercial measure of the value of steam as a heating agent.

Having demonstrated that the system of costing steam on the basis of water and available energy is both technically sound and easily applied to factory conditions, the authors considered the implications of this result upon economic steam usage to be as follows :—

(*a*) Steam is raised at temperature "T" and pressure "P" by the boilers, and its value is determined by certain charges incurred by the boiler plant which are placed to an energy account, in which the cost of steam energy is equal to

$$\frac{\text{Total cost of raising 1 ton of steam}}{\text{Energy available from 1 ton of steam.}}$$

There is also a "make up" feed water account, so that the cost of 1 ton of "make up" feed water can be deduced.

(*b*) The steam is distributed at its economic speed through mains carrying the economic lagging thickness.

(*c*) Some of the steam is used for generating electric power for drives insufficiently powerful or excessively distant for steam drives.

(*d*) Some of the steam will go to steam engines, and may be exhausted to evaporators which will be arranged to work with an economic difference of temperature.

Recent Developments

In view of the rapid recent developments in the design of high pressure boilers, the authors said it was appropriate to consider the supply of steam to a primary turbo-alternator set at 1,500 lb. per sq. in. absolute and 500° C. They assumed that the boiler plant would consist of three 50 T/hour high pressure boilers. Normally two of these boilers would supply steam to a primary turbo-alternator set of 9,000 kW M.C.R. capacity. The primary turbine would exhaust into mains at 300 lb. per sq. in. absolute, and these mains would supply a condensing and feed heating turbo-alternator set of 7,000 kW M.C.R. capacity, a No. 3 feed heater, and various steam drives in the factory. The steam drives would exhaust into mains at 30 lb. per sq. in. absolute, which would supply steam for reaction, evaporation and heating.

The comparative costs of steam and electric power was then deduced as follows for the above conditions.

For the *steam energy account,* suppose that the capital operating and maintenance charges on the boiler house, the feed heaters, the feed pumps, and the circulation water supply for the steam condensers, total £145,000 p.a.

	Annual Cost. £	Pence per kWh.
Capital charges	55,000	0.045
Cost of coal	67,370	0.056
Maintenance charges	7,000	0.006
Operating charges	8,000	0.007
Cost of electric power	7,300	0.006
Cost of " make up " feed water	330	—
	145,000	0.12

Distribution of Steam Power

100 T/hour of steam at 1,500 lb. per sq. in. absolute and 500° C. are sent out by the high pressure boilers. The equivalent theoretical steam power is 39,000 kW; but of this amount 5,500 kW are used for feed heating and 300 kW are accounted for by trasmission losses. Theoretical steam power, equal to 33,200 kW is thus available for distribution. The all-in cost per theoretical steam kWh distributed is accordingly 145,000 × 240/33,200 × 8,760 pence = 0.12 pence.

The distribution of theoretical steam power to the various consumers is indicated in the table below :—

Consumer.	Theoretical steam power consumed. kW.	Annual charges for. steam used £
Primary turbo-alternator set, which generates 8,750 electrical kW, the efficiency of conversion being 79%	11,100	48,500
Condensing and feed heating turbo-alternator set, which generates 6,250 electrical kW, the efficiency of conversion being 75%	8,350	36,500
Steam drives, which produce 5,700 B.H.P., the efficiency of conversion being 72%	5,900	25,750
Evaporation, heating and reaction	7,850	34,250
Total	33,200	£145,000

Power Plant Balance Sheet

A balance sheet for the power plant may be drawn up as follows :—

	Annual Cost. £	Pence per kWh.
Capital charges	18,000	0.035
Charges for steam used	85,000	0.155
Maintenance charges	3,500	0.005
Operating charges	3,500	0.005
	110,000	0.200

15,000 electrical kW are generated in the power plant; of this amount, 550 kW will be taken by the feed pumps, 250 kW will be taken by the circulating water pumps supplying the condenser in the power plant and the condensers on the site, and 200 kW will be taken by the boiler house auxiliaries; 14,000 electrical kW are thus left for export to the factory. The all-in cost per electrical kWh generated is accordingly 110,000 × 240/8,760 × 15,000 pence = 0.20 pence, and the allocation of charges for electric power exported from the power plant is :—

Consumer	Electric power exported from the Power plant.	Annual charge for electric power.
	kW.	£
Various plants on the site	14,000	102,700
Boiler plant, with all auxiliaries necessary for the production and utilisation of steam power	1,000	7,300
Total	15,000	110,000

A balance sheet for the "make up" feed water conditioning plant may be drawn up as follows:—

	Annual cost.	Pence per T.
	£	
Capital charges	500	0.4
Charges for raw water consumed ..	2,000	1.6
Cost of chemical reagents	700	0.6
Operating charges	200	0.2
Maintenance charges	200	0.2
Total	3,600	3.0

33 T/hour of "make up" conditioned feed water are produced. The cost per T of "make up" feed water is accordingly 3,600 × 240/8,760 × 33 pence = 3.0 pence, and the allocation of charges for "make up" feed water is:—

Real consumer.	"Make up" feed water rate. T/hour.	Annual charge for "make up" feed water. £
Various plants on the site which reject condensate to drain	30	3,300
Boiler plant	3	300
Total	33	3,600

Economic Velocity

Regarding the economic velocity for steam flowing along a pipe line, the authors said it is clear that the problem essentially rests in striking an economic balance between the capital charges on the pipe line and the monetary loss incurred due to pressure drop along the pipe line. As an example they took the case of transmitting steam at 290 lb. per sq. in. absolute and 350° C. For such a case the first cost of the pipe line, completely lagged, would probably be about $150.d^{1.4}$ pence per 10ft. run, where d = bore of pipe in inches. Assuming that annual capital and maintenance charges on the pipe line total 18 per cent. of the first cost of the pipe line, that is $27.d^{1.4}$ pence per 10 ft., if the pipe line has to transmit Q tons/hour of steam, the mean velocity in the pipe line will be $252.Q/d^2$ ft. per sec.; and the pressure drop per 10 ft. run of piping will be approximately $1.2 \times 10^{-4} \times 2.52^2 \times 10^4 \times Q^2/d^5$ lb. per sq. in.

The loss in theoretical available energy due to pressure drop can be calculated by considering the reduction in adiabatic heat drop due to throttling 1 ton of steam by 1 lb. per sq. in., when it will be found that the loss of theoretical available energy per ton of steam per 1 lb. per sq. in. throttle is 0.13 kWh. Thus, if the cost of steam energy is 0.12 pence per kWh, and if the pipe line is in commission throughout the year with an approximately constant rate of steam flow, then the annual monetary loss due to pressure drop per 10 ft. run of pipe will be $0.12 \times 8{,}760 \times 7.6 \times 0.13.Q^3/d^5$ pence = $1.050 \times Q^3d/^5$ pence.

Thus, the total annual all-in running cost of the pipe line, as represented by "annual capital and maintenance charges on the pipe line + annual monetary loss due to pressure drop along the pipe line" may be written down as $27.d^{1.4} + (1{,}050\ Q^3/d^5)$ pence per 10 ft. run of pipe. This total all-in running cost will have a minimum value, when $1.4 \times 27.d^{1.4} = 5 \times 1{,}050 \times Q^3/d^5$. Accordingly, if one requires a steam rate of 40 tons per hour, the economic pipe size will be 12.25 in. bore with a corresponding mean steam velocity of 67 ft. per second; or, if one requires a steam rate of 8 tons per hour, the economic pipe size will be 5.75 in. bore with a corresponding mean steam velocity of 61 ft. per second.

It will thus be found that a designed velocity of about 70 ft. per second is a reasonable figure to take. Indeed, an economic velocity of about 70 ft. per second seems to apply very approximately to steam conditions as widely apart as 650 lb. per sq. in. absolute and 450° C., and 30 lb. per sq. in. absolute and dry saturated.

The economic thickness of lagging to apply to steam pipes naturally depends on the first cost of the lagging, the annual value of heat lost through the lagging, and the thermal conductivity of the lagging. If it be assumed that the first cost of the lagging is proportional to the total volume of lagging employed, then the following simple formulæ can be derived to give the economic thickness of lagging:—

$$k.\log_e k. = (4/D_1) \times (3.B.K.\ \Delta\ T/p.A)\ \tfrac{1}{2},$$

and economic thickness of lagging = $(k-1) \times D_1/2$, where D_1 = outside diameter of pipe in inches; k = ratio of outside diameter of pipe to outside diameter of lagging; B = annual cost in pence of a heat loss of 1 kg. cal. per hour through the lagging when the pipe is in service; K = thermal conductivity of lagging in kg. cals. per sq. in. per hour °C./inch; Δ T = temperature drop across lagging in °C.; P = annual maintenance and capital charges on the lagging, expressed as a fraction of the first cost of the lagging; and A = first cost per cu. ft. of lagging in pence.

Thickness of Lagging

Values of "B" for three widely different steam conditions are given in the following table, which is based upon the piping being constantly in commission and upon a cost for steam energy of 0.12 pence per kWh:—

Steam conditions.	645 lb. per sq. in. abs. and 450° C.	290 lb. per sq. in. abs. and 350° C.	30 lb. per sq. in. abs. and dry saturated.
"B"=annual value in pence of a heat loss of 1 Kg. cal. per hour through the lagging..	0.70	0.63	0.28

If we consider the case of a steam pipe, 5 in. o.D., carrying steam at 290 lb. per sq. in. absolute and 350° C., and if we take the value of B = 0.63 from the above table, then for a lagging, with a first cost of 75 pence per cu. ft., and with annual capital and maintenance charges totalling 20 per cent. of its first cost, we can calculate the economic lagging thickness to be 4.0 inches.

For a flat surface the economic lagging thickness would be given by the simple expression $(12.B.K. \times T/p.A)\ \tfrac{1}{2}$. Applying this formula to the particular conditions considered above gives an economic lagging thickness of $(12 \times 0.63 \times 0.24 \times 315/0.20 \times 75)\ \tfrac{1}{2}$ in. = 6.2 in.

In regard to the economical vacuum to employ in a steam condenser, there are three factors to be taken into account—the charges due to condensing surface installed, the charges due to cooling water, and the cost of the theoretical available steam energy which is wasted. If one increases either the charges for condensing surface or the charges for cooling water, one will reduce the theoretical available steam energy which is wasted.

In the case of an evaporator working at high vacuum, it would probably be preferable to employ a jet condenser in place of a surface condenser, since the condensate would probably not be suitable as boiler feed. A jet condenser is, of course, much cheaper in capital costs than a surface condenser. Moreover, a good jet condenser should pull a vacuum approximately equal to that corresponding to the outlet cooling water temperature. The economic temperature rise of the cooling water in a jet condenser is given by the simple expression $(260.C_w/C_t)\ \tfrac{1}{2}$ °C., although in this case naturally other factors may prevent the economic temperature rise being employed in practice.

Points from the Discussion

Mr. C. S. ROBINSON said that at a wood pulp factory on the borders of Russia and Finland, which was driven normally by what was called cheap water supply, there had been a shortage of water during the last few years and back-pressure turbines had been installed to produce electricity for driving the mills. The steam for the back-pressure turbine was supplied in one instance by a Babcock boiler burning British coal, which was fairly dear there, and waste wood also was used. Their costs over a year for electricity from

the water power station and from the use of the back-pressure turbine were exactly the same—one-tenth of a penny per unit; power was generated from British coal at precisely the same cost as from waste wood.

Mr. R. J. LOW suggested that the authors had rather neglected the smaller users, and had slurred over the advantages of using engines. A very good case could be made out for using steam engines, even down to, say, 50 h.p., if they were close to the boiler house, and it would cost considerably less to run them than to run electric motors. The use of a pressure such as 1,500 lb. per sq. in. would give rise to difficulty in dealing with the water.

Mr. CAREY agree that, if it were convenient to use a small reciprocator, and if it were close to the boiler plant, there was no doubt that one should use it. He had never considered the problem of returning water in very small amounts. Certainly one had to return water over distances up to about a mile, and even more, but in a small chemical factory he felt sure it would not be possible to return such a large proportion of water as in a larger factory.

Mr. LOW suggested that if one could only return a portion of the water, it might be economical to generate at considerably lower pressures and work with conditioned water instead of distilled water.

Mr. CAREY agreed that if there were a very large wastage of water—up to 10 or 15 per cent., for example—one might have to consider altering the pressure of generation. He was not holding any brief for 1,500 lb. per sq. in.; it was referred to for the purpose of example, and not because he considered it necessarily the most economic pressure.

Some Advances in Analytical Chemistry

An Enormous Field Awaiting Investigation

THE annual general meeting of the London Section of the Society of Chemical Industry was held at Burlington House, London, on Monday, May 7, Dr. J. J. Fox, chairman of the Section, presiding. The following hon. officers and members of the committee were elected for 1934-5: Chairman, Dr. J. J. Fox; vice-chairman, Dr. Monier-Williams; hon. secretary, Dr. H. E. Cox; to fill vacancies on the committee, Mr. E. B. Anderson, Dr. W. A. Damon and Dr. T. H. Durrans. Following the annual general meeting, Dr. J. J. Fox gave an address on "The Position of Analytical Chemistry and Advances Therein."

Dr. FOX, in the early party of his address, said it was about 17 years ago that their old friend the late Mr. Chaston Chapman gave a lecture to the Chemical Society on advances in analytical chemistry and pointed out that the academic authorities of this country did not regard analytical chemistry so seriously as they should. Mr. Chapman gave as causes for this state of affairs, first, that at the latter end of the last century chemistry had become divided and subdivided (and, added Dr. Fox, that was more so to-day than it was 50 years ago) and, secondly, that organic chemistry had taken the sting out of analytical chemistry, or words to that effect. Personally, said Dr. Fox, he did not think that was quite correct. Indeed, on the contrary, he believed that the advances in organic chemistry had put into the hands of the analytical chemist a more valuable weapon than they had had before. Commenting that the lecture by the late Mr. Chaston Chapman was still worth reading, Dr. Fox quoted the following phrase from it: "Analytical chemistry, so far from being exhausted, is alive and originative of research." That, too, was his own view.

A Fine Field for Research

Analytical chemistry was alive and offered a fine field for research, and it ought to receive more attention from the authorities than it did at the present time. There were no chairs of analytical chemistry and the nearest step we got to it was the recent appointment of Dr. Harwood as a Reader at the Imperial College of Science. One reader for the whole of London, however, was not enough to place analytical chemistry in the position it deserved in relation to the other activities in Chemistry. The reason for this state of affairs was that the university authorities did not realise what analytical chemistry was. They were not aware what the practising analytical chemist had to do, or why he had to do it or anything in connection with it and they did not know that analytical chemists utilised the discoveries in pure science to advance their own science and in some respects extended the discoveries in pure science. In this connection he mentioned the very specialised work being carried out with regard to the freezing point of milk to avoid over-cooling, the fermentation of dough and the determination of small quantities of bismuth in lead, the latter being described as a most difficult piece of pure analytical investigation. There were many others, but none of them seemed to be properly appreciated outside the body of analysts themselves. Concluding this aspect of his lecture, Dr. Fox expressed the hope that his remarks would fall as seed on fertile ground.

Dr. Fox then dealt with a few advances that have been made in analytical chemistry in recent years and referred to the methods which are being adopted and developed at the Government Laboratory where he is engaged, adding that there is an enormous field for research work in still further improving methods of analysis of the character necessary in such circumstances. He first mentioned the determination of moisture analysis in tobacco and described what he referred to as practically mass production methods, having regard to the fact that often a thousand analyses of this nature had to be made in a day. He pointed out that the law had laid it down that the moisture in tobacco must be determined at 212° F. and as there was something like £50,000,000 or £60,000,000 per annum depending upon it, the analysis had to be made at this temperature although some people might ask why tobacco should be dried at all. A system of electric ovens had been devised for this purpose in which 100 to 200 samples could be dried at one time and an ingenious arrangement of a fan in the door of the oven had been found to prevent a trouble that used to exist of pockets of uneven temperature in the oven.

Another method of analysis described was for determining moisture in flour. In this a standard cell is used and the dielectric constant measured by means of a resonance curve. This apparatus will give results down to 0.1 per cent. moisture, but Dr. Fox pointed cut possibilities of further development which he said would involve two or three years' research work by several workers.

The Use of Azeotropes

Reference was next made to the use of azeotropes, the application of which had been worked out by Lécat for such purposes as the preparation of pure xylene free from benzol and toluene, the removal from benzol of the small traces of aliphatic hydrocarbons and so on. This process is being developed considerably under the direction of Dr. Fox. In this connection was mentioned the problem of solvents in cellulose lacquer, describer as "a pretty tough proposition," even for the pure research chemist. Yet another problem was the separation of ethyl, isopropyl and butyl alcohol, which also wanted some doing, but it was done with the aid of azeotropes, although again there was still an enormous field to be explored. Other matters referred to were the use of the interference refractometer, the photo-electric cell and the magneto-optic method devised in America, but which was based on Faraday's experiments. In all these methods, Dr. Fox pointed out the enormous field for research and development and in emphasising the work being done by the analytical chemist in this direction expressed the hope that analytical chemistry would no longer be regarded as consisting of putting something into a test tube or weighing something on a balance.

Standard Costs in Chemical Manufacture

By L. A. WIGHT, A.C.W.A.

COST accounting is recognised to-day as an important branch of the accountancy profession. During the last ten years considerable progress has been made in the application of suitable costing methods to meet the requirements of industry. The demands now made of cost accounting are, therefore, more exacting than ever.

An efficient system of costing should provided reliable production costs in order that the sales organisation may determine selling prices. In addition to this, but by no means of lesser importance, analytical control should be provided over the whole activities of the concern, in such a manner that those responsible for administration may have a clear view of efficiency in terms of cost. This is known to-day as "cost control." In an organisation where the necessary knowledge of costs is not available, control becomes more or less the force of authority. When this knowledge is available, however, control simply represents guidance, which is supported by facts. Cost control may be analysed as follows:—

(1) A defined aim or ideal as to what the cost *should* be.
(2) An *immediate* and adequate knowledge of the *actual* cost.
(3) An appreciation of the difference, if any, between the *ideal* and the *actual* cost.
(4) The capacity to make and the authority to enforce decisions for the purpose of eliminating, where possible, any difference between the *actual* and the *ideal* cost.

Items 1 and 4 represent the functions of control; items 2 and 3 are the essentials necessary to permit of this control being carried out, and it is chiefly with the provision of this information that cost accounting is immediately concerned with. The question therefore arises as to what should represent the "ideal" cost, which is to be used as the measure of comparison. It is here that "standard costs" can be put to effective use, in as much as they represent the most economical cost of production obtainable under certain specified conditions. In the absence of standard costs, the extent to which the required efficiency in production is being obtained can be seen only by comparing current costs with those of a previous period. In these circumstances, therefore, it will be quite apparent that the usefulness of such a comparison will naturally depend on whether, or not, the previous costs represent a true basis on which to judge the current results.

Dissecting the Elements of Costs

Standard costs may be briefly defined as representing the *scientific* fixing of "cost standards" before work is commenced, and, by determining the causes of variations from the standard, ensuring an effective control of the cost while work is in progress. These standard costs, or cost standards, being representative of the standard of efficiency expected, therefore provide a valuable basis on which to judge the actual results obtained from time to time, so that the trend of efficiency may be noted. The idea of pre-determining "cost standards" is by no means entirely new, although its uses have been considerably extended during recent years. Incentive methods of remunerating labour, such as piecework and premium bonus, have been in use for some considerable time, and the determination of cost standards in relation to labour is an integral part of any incentive wage method. To apply this principle to the whole process of production simply means carefully dissecting the various elements of cost, and by pre-determining reliable cost standards for each element, an efficient and constructive policy of control can be exercised.

In the production of any commodity involving the use of labour, material and machinery, the factors which will influence variations in cost can be easily determined, so that each may represent a point, or a stage in the process, where it is desirable to apply some measure of control. The following causes of variations in cost may be taken as typical examples:—

Labour Cost Variations.—Pay rate, Time, Spoilage, Man-effectiveness.
Material Cost Variations.—Price, Usage.
Overhead Cost Variations.—Spoilage, Machine-effectiveness, Operating level (degree of capacity used).

If cost standards are prepared for each element, an effective measure of control can be applied while work is in progress, instead of on the completion of work, when the information is then only a matter of history. It should be noted, therefore, that the object of standard costs is to induce a prospective rather than a retrospective outlook. One of the principal benefits of standard costs is that preventable inefficiencies or waste can definitely be determined. Undoubtedly, many inefficiencies will be reflected which cannot be entirely eliminated, but the first step necessary in order to cut out losses or inefficiencies is to determine the extent to which they occur in terms of money.

New Dyestuffs

Solochrome Azurine BS

SOLOCHROME AZURINE BS, produced by Imperial Chemical Industries, Ltd., yields pure blue shades of very good fastness properties. It is of interest for use in all branches of fast wool dyeing where light fastness is not of first importance. It is applicable to all forms of woollen materials and is equally suitable for piece dyeing and for application to loose wool and slubbing in dyeing machinery. This dyestuff, moreover, is suitable for self shades, for use in combination and for shading purposes generally as it may be dyed either afterchrome, metachrome or chrome mordant, each process giving shades of excellent fastness to milling and potting. It produces bright shades of blue on natural silk by the afterchrome and chromium chloride mordant methods and yields shades of very good fastness to water and washing. On account of its good fastness to acid planking it is of interest for application to loose wool and fur used in the manufacture of felt, and of value where chrome dyestuffs of bright shade are required as ground shades for the production of discharge styles.

Dispersol Fast Crimson BS

DISPERSOL Fast Crimson BS, another new I.C.I. product is suitable for dyeing all forms of acetate silk materials and gives bright crimson shades which are distinguished by their good fastness to light and washing. It is suitable for producing both crimson and compound shades where fastness to hot pressing and marking-off is desired. It can be used for the direct printing of acetate silk fibres and shows practically no tendency to mark off during the steaming process. It is also of special interest for the dyeing of acetate silk goods for subsequent discharging as good whites are obtained by the Formosul-calcium or zinc sulphocyanide process. It possesses very good affinity for the acetate silk fibre and can be dyed without the addition of assistants to the dyebath; the presence of soap or soluble oil, however, assists penetration and level dyeing. It is, moreover, unaffected by the presence in the dyebath of assistants necessary for the dyeing of other textile fibres, *i.e.*, acids, alkalies, glauber's salt, etc., and may be used in conjunction with other dyestuffs for the production of solid shades on mixed goods containing acetate silk by the one bath process.

Brilliant Acid Cyanine 6B

BRILLIANT ACID CYANINE 6B, introduced by the Geigy Colour Co., Ltd., is a new homogeneous dyestuff for dyeing wool and silk from a weakly acid dyebath, and is distinguished by its purity of shade combined with good fastness to washing, water, perspiration, stoving and decatising, and very good fastness to sea water. The fastness to light is definitely better than that shown by older brands of Brilliant Acid Blues. The new dyestuff gives bright dyeings on wool, silk, and fabrics composed of both these fibres (on which solid results are obtained), it is also suitable for direct printing on these fabrics. In light shades it can also be used for discharge printing. It is unaffected by chrome and is therefore suitable for shading dyeings with eriochrome colours. It also draws well in a neutral bath.

Industrial Alcohol for Motor Fuel

By A. E. WILLIAMS, F.C.S.

THE production of alcohol in this country for industrial purposes has been, in the past two years, practically doubled. At the present time one important British company is producing, as a new type of motor fuel, a mixture of alcohol and petrol which possesses properties superior to straight petrol. It is estimated that this latest innovation will increase the demand for alcohol in Great Britain by several million gallons annually. The question of adequate supplies will accordingly come to the fore. Up to the present time the bulk of the industrial alcohol produced here has been prepared from molasses; the supply of which is limited to the amount of sugar refined. The latter industry could not meet a greatly increased demand for the by-product molasses, so that an additional source of alcohol would have to be sought. It is generally acknowledged that the most economical alternative is the utilisation of potatoes. On the Continent this industry is well established, and in Germany alone it is estimated that over two thousand potato-alcohol distilleries are in operation.

Alcohol from Molasses

Molasses is the mother-liquor resulting from the sugar-manufacturing operation; in the case of the cane product it contains from 30 to 35 per cent. of sucrose, besides a small proportion of invert sugar, chiefly glucose. Beet molasses contains from 40 to 45 per cent. sucrose and usually about one per cent. of invert sugar. Before fermenting the molasses, it is invariably the practice to boil it with a small proportion of mineral acid, generally sulphuric acid. The acidification of the molasses in this way is essential in order to neutralise the alkalinity present, chiefly carbonates of soda and potash. The acid and boiling treatment also has the effect of destroying bacteria which would be harmful to the yeast.

Although this inversion of the sugar is not absolutely necessary, since it would be slowly inverted by the invertase of the yeast, it has the effect of speeding up the fermentation process considerably. In practice the quantity of acid added is such as to leave about 0.10 to 0.20 per cent. in the liquor to be fermented. Before fermentation the liquor is diluted to a specific gravity of about 1.050-1.060; and in some cases is filtered or centrifuged to eliminate solid matter. An addition of hydrofluoric acid or a fluoride, about 0.03 per cent., to the liquor before adding the least is also the usual practice; these agents preventing the growth of bacteria, etc., during the fermentation process. Best results are obtained when the yeast in use has been specially acclimatised to the hydrofluoric acid, etc., by developing it in a concentrated liquor containing the acid.

Alcohol from Potatoes

The preparation of alcohol from potatoes is a somewhat longer operation, for in this case sugar has first to be produced from the starch in the tubers. After a thorough cleansing of the latter, they are steamed in a pressure vessel, which serves to gelatinise the starch and to convert the potatoes to a pulp. This pulp is then acted upon, at a temperature of about 40° to 45° C., by malt, which saccarifies the starch. The preparation of a suitable distillery malt is perhaps the most important stage in this process; for unlike the preparation of brewer's malt, in which the diastase content is purposely limited, the production of distiller's malt involves the development of the diastase to the full extent. As in brewing, barley is the grain commonly used for preparing the malt. During germination, two of the enzymes formed are diastase and cytase; the latter makes the cellular layer of the grain permeable and thus allows the diastase to act on the starch and convert this into sugars, which are readily assimilated by the growing embryo. Since the enzyme cytase is destroyed at a temperature approaching 60° C. (but not the diastase) it is important to keep the temperature well below this until the cytase has fulfilled its function.

According to recent investigations, diastase (amylase) can exist in barley in two distinct forms, -amylase and β-amylase. The first enzyme is present in ungerminated grain, and whilst it possesses no action on ordinary starch—in the absence of β-amylase—it rapidly converts transitory starch, such as is found in the leaves of the potato plant, into maltose. During germination of the barley, the α-amylase increases gradually. After the end of the first week or so of germination, β-amylase is formed, its rate of production varying with the conditions of germination. The formation and amount of each enzyme present is considered to be entirely independent of each other. As germination proceeds, the β-amylase is assumed to effect the transformation of the starch in the grain to dextrine, which are then attacked by the α-amylase and converted to maltose.

In the steeping of the grain, which is carried out at a temperature of about 12° C., a weak solution of calcium bisulphite or other sulphite is commonly employed. This has the object of keeping down the growth of moulds and bacteria. The grain is then spread out in thin layers on the malting floor, where it remains until germination is complete requiring from three to four weeks. The saccharification of the starch in the potato pulp is accomplished by adding about 10 per cent. of the barley malt to the pulp, previously thinned down with water, the mixture being agitated at about 40° C. After maximum saccharification has been obtained, the sugary liquor is separated from the solids either by filtration or by centrifuges. The liquor is then fermented by yeast in the same manner as for molasses liquor.

Modern distillation plant will produce an alcohol of 95 to 96 per cent. strength in one passage of the weak fermented liquor through the plant; and will, simultaneously, separate the by-product fusel-oil, aldehydes, etc. When the alcohol is intended for motor fuel, the last traces of these by-products are sometimes removed by the use of activated carbon; since traces of fusel oil and other impurities in the alcohol cause heavy deposition in the internal combustion engine. The method of carbon treatment consists essentially of filtering the alcohol through a layer of the carbon. When exhausted, the latter may be revivified by calcination.

Use as a Motor Fuel

Unlike petrol, the supplies of which are limited, alcohol may be produced in any desired quantity from an inexhaustible supply of raw material. The several per cent. of water found in commercial alcohol, the elimination of which on a large scale would be uneconomic, does not appreciably affect the efficiency of an internal combustion engine As a matter of fact, an engine will run, thought not efficiently, on a mixture of equal parts of alcohol and water. Vapour tension of the fuel is an important factor, and the presence of water up to 10 per cent. does not greatly affect this value. For example, at 0° C., and also at 10° C. the vapour tension (in millimetres of mercury) of 100 per cent. and 90 per cent. alcohol is the same, *viz.*, 12 and 24 respectively. But at higher temperatures the vapour tension of 90 per cent. alcohol is slightly lower than absolute alcohol; at 80° C. the figures are 810 and 782 respectively. Compared with petrol and benzol, the vapour tension of alcohol is very low; at 0° C. the figures are: Petrol (an average fuel) 46; benzol 26; alcohol 12. Certain mixtures of alcohol and petrol, and alcohol and benzol have a vapour tension higher than either of the fuels alone; this mixture is roughly 30 of alcohol to 70 of petrol or benzol. Such a mixture possesses anti-knock properties, and is specially suitable for high compression engines.

To run an engine efficiently on alcohol alone, several adjustments have to be made; such as adjusting the carburettor float to suit the specific gravity of the alcohol. The latter also needs only about 60 per cent. of the air required for the complete combustion of petrol; whilst the compression pressure in the engine must be approximately doubled for alcohol. From tests carried out by numerous investigators, it is found that when an engine is properly adjusted to use alcohol, the latter fuel gives about the same efficiency and economy as petrol.

Carbon Bisulphide Dangers

Precautions Against Poisoning, Fire and Explosion

PRECAUTIONS against dangers of poisoning, fire and explosion in connection with the use of carbon bisulphide in artificial silk, india-rubber and other works are given in a recently-published memorandum of the Home Office Factory Department (Form 836, of March, 1934, H.M. Stationery Office, price 3d. net.).

The vapour of carbon bisulphide is toxic, even in low concentrations, and has a profound effect on the nervous system. The usual effects in workers exposed to the vapour of carbon bisulphide are chronic in character and are produced by the inhalation of small quantities of the vapour over some weeks or months. Among the first symptoms of ill-health are nausea, indigestion, headache and giddiness, sometimes accompanied by emotional disturbances which may be frankly hysterical in character. In cases of mild absorption of the vapour, an appearance of anxiety with sweating of the hands and forehead is suggestive. Such symptoms indicate a degree of exposure which, if continued, may lead to effects chronic in character, unless the worker is removed from the toxic atmosphere.

By an Order of the Secretary of State date December 31, 1924, poisoning by carbon bisulphide contracted in a factory or workshop was made compulsorily notifiable to the Chief Inspector of Factories by medical practitioners, and by occupiers to the District Inspectors of Factories.

Storage Buildings

Storage buildings for carbon bisulphide should be constructed of fire-resisting materials. The liquid is very heavy (sp. gr. 1.29) and only slightly soluble in water (100 cc. of water dissolve 0.179 gm. at 20° C.); it is usual to store it in a tank under water or covered by inert gas (carbon dioxide or nitrogen). When filling the tank, the carbon bisulphide is forced from the drum by use of compressed inert gas or water. In the same way the carbon bisulphide is forced to the plant where it is used, by pumping into the storage tank either inert gas or water. To avoid leakage from the system if a pipe becomes blocked up while the liquid is being pumped, a return valve is arranged in the pump system which opens when there is excessive pressure, and allows the water to return to the inlet side. Pipes carrying the liquid must be carefully connected so as to avoid leakage. In some cases flanged wrought iron tubes are provided with graphite packing between the flanges. Where the pipes are carried underground, it is sometimes difficult to detect a leak, and in one works a slight explosion resulted from the leaking vapour becoming ignited at a boiler fire. Some firms recommend the avoidance of brass fittings in such plant as they state that copper sulphide, formed by the action of the carbon bisulphide, may on oxidation become hot and cause ignition.

Attention to Tanks

A storage tank should be well separated from the plant and process rooms of the works. It is undesirable that men should be allowed under any conditions to enter tanks which have contained carbon bisulphide until the tanks have been thoroughly cleansed by repeated charges of hot caustic soda solution, followed by several hot water washes, and finally allowed to stand open for three days to make sure that any traces of vapour are removed. Unless a responsible person is prepared to certify that a tank is completely free from vapour no person should be allowed to enter unless he is wearing an efficient breathing apparatus and rescue belt, the rope of the latter being held by another person directly outside the tank. Where it is necessary to scrape sludge from the bottom of such a tank, the use of an aluminium scraper is advised, and spanners made of this metal are also recommended for use on such plant, in order to avoid risk of striking sparks.

In the churn rooms at artificial silk works water ring pumps (vacuum pumps of the centrifugal type) are used for the purpose of exhausting the last traces of carbon bisulphide vapour from the churn before it is opened for discharge. The eccentric impeller of the pump revolves in water retained in the casing; the vapour-air mixture from the churn is thus exhausted in contact with water, and risk of explosion is reduced. If ordinary pumps are used for the purpose of exhausting such churns, there is some possibility of spontaneous ignition due to overheating on the discharge side of the pump. Churn rooms should be ventilated by means of exhaust fans at floor level on one side of the room, together with inlet openings at moderately high level on the opposite side of the room so as to maintain a cross current of air. All leakage of vapour must be carefully avoided as a slight escape in a room may cause severe poisoning.

Employment Regulations

The use of carbon bisulphide in any process of india-rubber manufacture is subject to certain requirements of the India-rubber Regulations, 1922. These regulations require that no person under 18 years of age shall be employed in any process in which carbon bisulphide is used or its vapour given off, and no person under 16 years of age in any room in which any such process is carried on. Also, no person shall be employed in a room in which carbon bisulphide is used, for more than five hours in all in any one day nor for more than 2½ hours at a time without a rest interval of at least one hour. In addition, efficient exhaust draught must be provided for all such fume processes and efficient arrangements made for supplying fresh air to each workroom. The fan exhaust must be so placed that discharged vapour cannot re-enter any workroom. The working places, machines, etc., should be enclosed as far as practicable and work carried on from outside the enclosure, a powerful in-draught being maintained at the working openings.

In the "cold cure" vulcanising of fabrics, the vulcanising machine and the drying cylinder or other drying apparatus should be within a chamber, or chambers, under powerful exhaust. The cloth is fed into and delivered from the chambers, through narrow slits or openings which, by the action of the exhaust, function as air inlets to the chambers. The overhead run for the material, between the chambers, is also fully enclosed. The exhaust within the chambers is applied at floor level by means of under-floor ducts of large cross-sectional area with well-fitting gratings at the floor openings. The chambers should be entered only when necessary. The reservoir of vulcanising liquid which supplies the feeding trough of the apparatus is so enclosed and arranged that the fumes tend to be drawn into the vulcanising chamber. The carbon bisulphide is used as a diluent with sulphur chloride (the vulcanising agent). The preliminary mixing of the two materials, if not done in the open air, should be done under efficient exhaust ventilation.

Fire Prevention

Where carbon bisulphide is used or stored, every precaution should be taken to exclude naked lights, presence of hot pipes or other hot plant. Ordinary safety lamps which may have been certified for use in mines are not necessarily safe in atmospheres containing carbon bisulphide, and should not be used unless specially certified. Adequate appliances should be kept in constant readiness for dealing with any outbreak of fire which may occur. Extinguishers of (a) the foam type or (b) those containing either carbon tetrachloride or methyl bromide are effective. If type (b) is used in a confined space, the fumes must be avoided. Adequate means of escape in case of fire must also be provided in all stores and workrooms.

Under Regulation 27 of the Electricity Regulations (Statutory Rules and Orders, 1908, No. 1312), all conductors and apparatus exposed to inflammable surroundings or explosive atmospheres are required to be so constructed or protected and such other special precautions taken as may be necessary to prevent danger in view of such exposure. Where carbon bisulphide is used, or stored, motors and control gear should be of flameproof construction to the appropriate British Stan-

dards Institution specification, or, alternatively, they should be located outside the room or area in which carbon bisulphide is present. Where motor switchgear only can be placed outside, flameproof push buttons should be placed near the motors or driven machines for stopping them in cases of emergency. Flameproof construction for lighting fittings is also necessary, using the appropriate British Standards Institution specification, or, alternatively, the lights should be located outside windows of the room or area in which carbon bisulphide is present. It is also necessary to ensure that the rating of the lamp bulbs within the fitting does not result in heating of the latter to a temperature approaching the auto-ignition temperature of carbon bisulphide (125°-135° C.). Switches should either be flameproof as above, or located outside. Portable electric handlamps connected to the supply mains should not be used on account of the danger of breakage and of open sparking from damaged flexibles. No electric handlamp or other type of miner's lamp has yet been specifically certified as suitable for use in atmospheres containing carbon bisulphide vapour.

The flow and agitation of carbon bisulphide in pipes and tanks tends to generate charges of static electricity which may accumulate to a dangerous degree under certain conditions and cause sparking. Metal pipes and tanks should, therefore, be efficiently bonded at all joints and earthed. It has also been found that static charges are dissipated if the relative humidity of the atmosphere is not allowed to fall below 60 per cent.

Rubber Production Control

Inter-Governmental Agreement Signed

THE Rubber Growers' Association have announced that negotiations for rubber regulation have been concluded and complete agreement has been reached. The inter-governmental agreement was signed at the Foreign Office on Monday, May 7, by representatives of France, the United Kingdom, India, Netherlands, and Siam.

The object of the scheme is set out in the forefront of the agreement in terms to the effect that "it has been considered necessary and advisable that steps should be taken to regulate the production and export of rubber in and from producing countries, with the object of reducing existing world stocks to a normal figure, adjusting, in an orderly manner, supply to demand, and maintaining a fair and equitable price-level which will be reasonably remunerative to efficient producers." The scheme is comprehensive in its scope and is to apply to Malaya, Netherlands, India, Ceylon, India (including Burma), French Indo-China, North Borneo, Sarawak and Siam.

Recognising that the present sources of supply are more than are necessary to satisfy any probable world demand for a few years, further planting of rubber is prohibited except for experimental purposes, and only to an extent equivalent to one-quarter of 1 per cent. of any territory's existing total planted area. This will effectively check the further planting that would otherwise result from the stimulus given by the higher price that may be established under the rubber regulation scheme. For the same reason replanting is limited to the equivalent of 20 per cent. of the existing planted area of any one holding, which, it is estimated, should provide adequately for depreciation. The export of planting material from territories within the scope of the agreement is also prohibited. To prevent an abnormal accumulation of stocks the agreement provides that producers, as well as dealers, shall keep their stocks to the normal percentage of their overturn.

A New International Committee

A new international committee, designated "The International Rubber Regulation Committee," is being constituted of delegations appointed by the respective Governments of the territories mentioned. Each delegation will have one vote for every complete 1,000 tons of the quota of the territory it represents. It will be the main business of this committee to fix the percentage of allotted quotas that the territories may export. Representatives of rubber manufacturers in Europe and America will be invited to nominate a panel, which may tender advice to the International Rubber Regulation Committee on stocks, exportable percentage and other matters.

The scheme is to run, for a minimum period, commencing June 1, 1934, and terminating on December 31, 1938, but prior to the latter date the International Rubber Regulation Committee shall make a recommendation to the Governments as to the continuance or otherwise of the regulation.

Representative committees in London and in the Eastern producing countries have considered the proposals embodied in the international agreement, and have pronounced in their favour. The quotas assigned to the territories within the scheme are the measure of their potential producing capacity. The quotas for 1934 amount to 1,019,000 tons. The total quantity of crude rubber produced in 1933 from all territories outside the scheme was only 12,970 tons. The amount of rubber to be exported from time to time will be determined by the International Rubber Regulation Committee, which will have the benefit of advice from representatives of rubber manufacturers from Europe and America.

Questions in the House of Commons

In the House of Commons on April 30, Lord Winterton (Horsham and Worthing) asked the Colonial Secretary what action the Government proposed to take with regard to the agreement.

In reply, Sir Philip Cunliffe-Lister said the Government in the United Kingdom had received a request from the Rubber Growers' Association to give effect to the agreement in so far as it relates to the colonial Empire, and it had decided, after consultation with the colonial governments to take the necessary measures for this purpose, subject to similar undertakings being given by the other governments concerned.

Sir E. T. Campbell (Bromley) then asked if Sir Philip Cunliffe-Lister was assured in his own mind that the proposed scheme is practicable, and if he would say when he or any of the governments concerned propose taking the necessary action to put it into force?

In reply to this question, Sir Cunliffe-Lister said that "so far as our territories are concerned, we can hope to put it into force as from June 1." He had every reason to hope and believe that that will be equally possible in other territories. Speed in this matter was very important. His Majesty's Government would not enter into any agreement unless it was satisfied that it was comprehensive, fair and practicable. On this matter he had been at great pains to get the considered judgment of those most fully acquainted with the industry and best able to judge.

First Meeting of the Committee

The International Rubber Regulation Committee constituted under this Inter-Governmental Rubber Regulation Agreement held its first meeting on May 8, when Sir John Campbell was elected chairman, and Professor Van Gelderen, vice-chairman.

The committee decided to invite certain bodies, representatives of rubber manufacturers, to nominate persons to serve as the advisory panel provided for by the regulation scheme. It is hoped that nominations will be received in time for the panel to attend the next meeting of the committee. In order to facilitate the administrative arrangements necessary for the introduction of regulation at very short notice the committee decided that the reduction of exports should be effected gradually. They fixed the amount which each territory may export at 100 per cent. of the basic quota for June and July, 90 per cent. for August and September, 80 per cent. for October and November, and 70 per cent. for December, 1934.

A Modern British Fertiliser Factory

Converting Phosphate Rock into Superphosphate at Ipswich

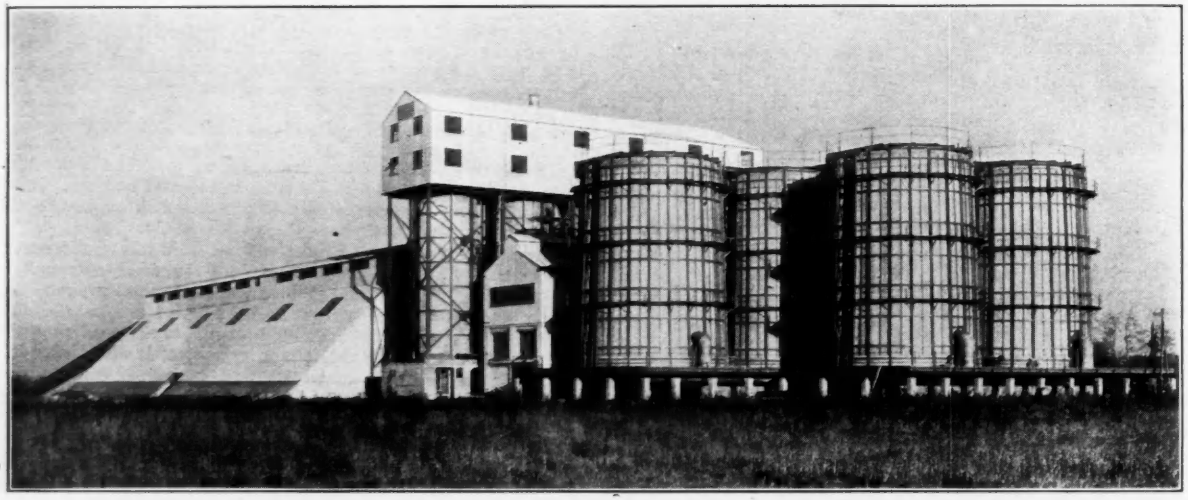
THE new factory which Fison, Packard and Prentice, Ltd., have erected at Ipswich is claimed to be the most modern and best-equipped fertiliser plant in Europe. It is, moreover, the first European factory to carry on the manufacture of dry, granular superphosphate, which is "free flowing" in the true sense.

Superphosphate is made by dissolving finely ground phosphate rock in sulphuric acid. It is by this means that the insoluble phosphates are converted into water-soluble phosphates. The process has not changed to any extent for a great many years, although experiments and investigations have been carried on unceasingly to reduce the moisture con tent and the amount of free acid present in the final product. As sold for the past 30 years, superphosphate has contained 14 to 16 per cent. of moisture, together with an appreciable percentage of free acid; in addition, the physical nature of the product has been "soft" and inclined to clog fertiliser drills. The new granuluar superphosphate, which is made at the Ipswich factory has solved these problems. Not only has the moisture content been reduced to about 8 per cent. and even this percentage may be still further reduced, but such moisture as is present is combined in a different way, so that the product is of a dry, granular, gritty nature. In addition, the amount of free acid remaining in the product is reduced to a negligible quantity, which is a most important consideration, especially in compound fertilisers.

The Ipswich factory has a present output of 50,000 tons of granular superphosphate per annum, which is sufficient for making 100,000 tons of compound fertilisers. The site, extending to 15 acres, adjoins a deep-water quay where ships carrying up to 8,000 tons of cargo can lie afloat at all stages of the tide. At this quay, cargoes of the necessary raw materials, including phosphate, pyrites, potash and nitrogenous materials, can be discharged at the rate of 1,000 tons per eight-hour shift, and distributed from the quay side direct to different points in the factory by means of a modern conveyor system. Similarly, the finished fertilisers can be loaded back to ship in bags or in bulk for despatch by coasting vessel, or ocean-going cargo boat, to all parts of the world. Ships carrying phosphate rock, imported mainly from North Africa, are unloaded by grab cranes which discharge into hoppers at ground level and thereby reach a subterranean belt conveyor which is housed in a reinforced concrete tunnel built into the quay. Passing along this conveyor the rock is ultimately elevated to an overhead conveyor, by means of which it travels to the phosphate store and is there deposited at any desired point by means of a "throw-off" carriage. This store has a capacity of 12,000 tons of phosphate rock.

The rock is conveyed from the store to the crushing and grinding mills by means of an automatic shovel which is capable of moving 40 tons per hour. It is first crushed in a Sturtevant fine crusher and then passed to a battery of three Sturtevant ring roll mills. In these ring roll mills the material passes between an outer positively-driven ring and three spring-held rolls which are driven by the ring itself. The ground material is then conveyed to a centrifugal air separator, where the fine particles reach a storage hopper whilst the coarse particles are returned to the mill for further grinding.

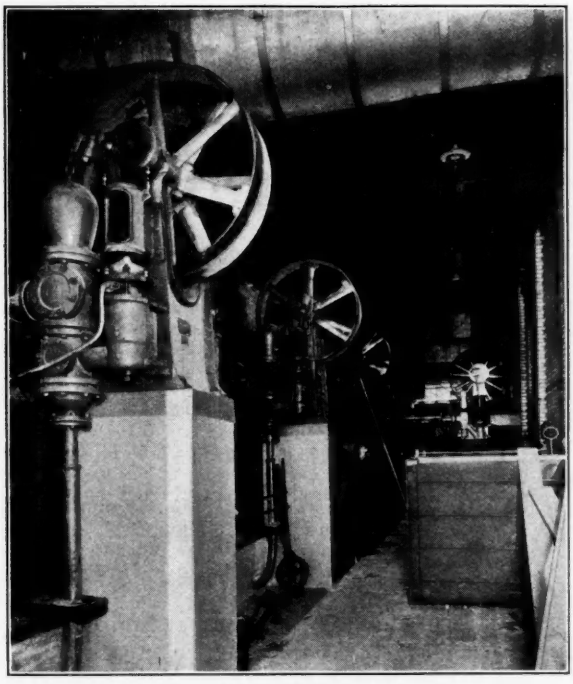
The sulphuric acid plant, shown in one of the accompanying illustrations, has the advantage of all the latest improvements and developments in acid making. It was designed and erected by the Mills Packard Construction Co., Ltd., a company associated with Fison, Packard and Prentice, Ltd. The unit comprises a store for pyrites capable of holding 10,000 tons; a burner house where sulphur gases are obtained by roasting the pyrites in four Herreshoff furnaces, each with a capacity of 12 tons of pyrites per day; and chambers and towers for converting the gases to sulphuric acid. The capacity of the plant is 26,000 tons of acid per annum, and no less than 450 tons of lead were used in its construction.



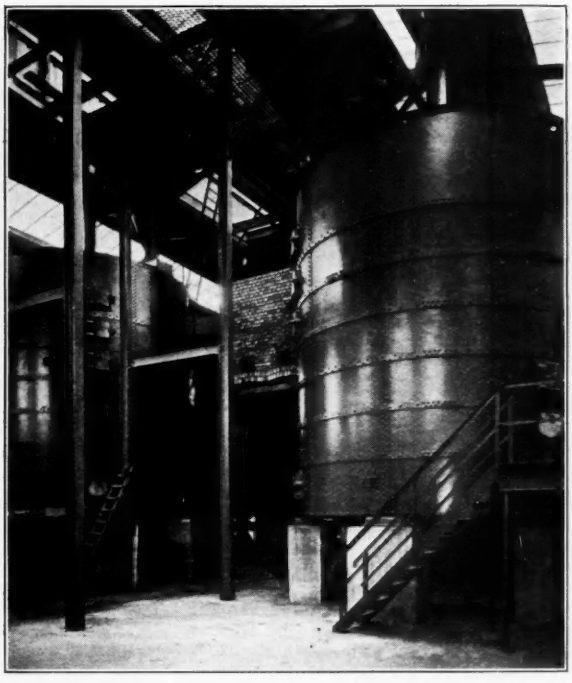
General View of the Sulphuric Acid Plant at the Fertiliser Factory of Fison, Packard & Prentice, Ltd., Ipswich.

Weighed charges of ground phosphate rock and sulphuric acid are delivered to the digester or autoclave, which is the crux of the remarkable Oberphos process. In the ordinary process of superphosphate manufacture, after the reaction has been carried out as far as possible in the mixer and den, the material is transported to a "curing pile," where the reaction is completed and drying of the material takes place, with the result that it forms a solid rock-like mass which has to be reground before it can be used. In the Oberphos process, however, the reaction is carried to completion in a closed vessel under elevated temperature and pressure. Consequently not only is the reaction accelerated by these physical conditions, but also there is no loss of water during the reaction period, and therefore the acid remains at the predetermined concentration at which it is most reactive. In addition, there is no escape of fumes during the reaction, and the superphosphate produced by this process is in a finely divided granular condition, particularly suited for agricultural purposes.

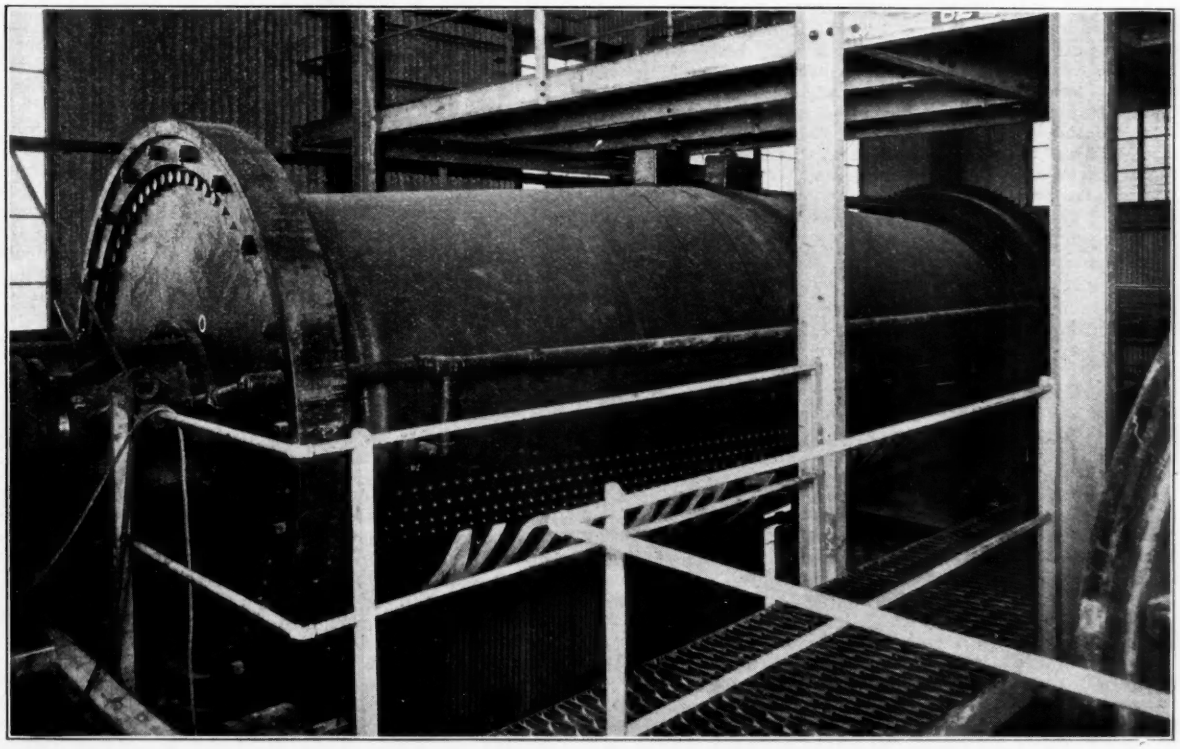
In the autoclave building two rotary digesters or autoclaves have been installed, each with a capacity of 25,000 tons per annum. These digesters, which were supplied by



A Battery of Acid Pumps, which have been specially selected to withstand severe corrosion conditions



The Burner House showing two of the four Herreshoff Furnaces, each with a burning capacity of 12 tons of pyrites per day.



One of the Rotary Digesters in the Autoclave Building; these digesters are homogeneously lead-lined, and are steam-jacketed and built to withstand both pressure and vacuum whilst revolving at four to five revolutions per minute.

Superphosphate Manufacture at the Fertiliser Factory of Fison, Packard and Prentice, Ltd., Ipswich.

Photographs by courtesy of "The Industrial Chemist."

the Kestner Evaporator and Engineering Co., Ltd., are 21 ft. in length and are of a double cone-like cylindrical shape, 5 ft. 7 in. inside diameter at each end and 6 ft. 7 in. inside diameter at the centre. They are steam-jacketed for steam at 75 lb. per sq. in., to enable the correct temperature to be maintained during the process, and the insides are homogeneously lead-lined to a thickness of $\frac{3}{8}$ in. They revolve at four to five revolutions per minute, and are alternatively submitted to vacuum and pressure during the reaction period. The materials required for each charge are automatically weighed and are introduced into the digester through special valves.

The main building of the factory has a storage capacity of 16,000 tons of finished fertilisers and is one of the largest buildings in the British fertiliser industry. It is 60 ft. high to the eaves, and is built on reinforced concrete piles, which are driven 40 ft. into the ground. An overhead electric crane is used to distribute materials, and along the whole length runs a covered loading platform, lying alongside the private railway siding, whilst at one end is a further covered loading platform for road traffic. This building also has two towers, in which are installed the mixing, grinding and bagging plants, each with a capacity of 60 tons an hour.

Electric power is used throughout the factory, which is equipped with seventy motors generating over 800 horsepower. The power consumption is about one million units of electricity per annum.

The Phenomenon of Thixotropy

An Important Factor in the Behaviour of Paints

THIXOTROPY was the subject of a lecture which Mr. J. Pryce-Jones delivered to the Oil and Colour Chemists' Association on April 24. The chair was taken by the president, Mr. J. A. F. Wilkinson.

The term "thixotropy," said Mr. Pryce-Jones, was first introduced by Freundlich and Peterfi and refers to the reversible isothermal sol/gel transformation by means of mechanical or other means. The phenomenon was of fairly general occurrence in disperse systems and played an important part in the behaviour of paints and other well-known industrial commodities. Well-known examples of thixotropic systems were represented by paraffin and zinc oxide; litharge and glycerine; vanadium pentoxide sol; benzoyl-cystine sol; barium malonate in alcohol; certain kaolins in water and numerous paint and enamel systems. To Professor Freundlich, however, we owed the greatest debt for the investigation and elucidation of the principles underlying the phenomena of thixotropy. He had worked principally with ferric oxide sols, aluminium hydroxide sols and with bentonite, and these three systems are typical examples whose behaviour are characteristic of thixotropic systems in water.

Bentonite Water Gels

The lecturer briefly summarised the behaviour of bentonite water gels by stating that a dialysed bentonite is not thixotropic, but the property is developed on the addition of very small amounts of an electrolyte such as potassium chloride. Excess of the electrolyte leads to a breaking up of the gel and syneresis rapidly ensues with the formation of a soft spongy deposit. If a small amount of a peptising agent such as sodium silicate is added (0.01 per cent.) the gel formation is destroyed and a hard settlement is obtained. These reactions are typical of thixotropic behaviour in polar media and indicate that thixotropy represents a stage intermediate between peptisation and complete precipitation of the sol. Analogous behaviour appears in systems in non-polar media though the stages are not so clearly defined.

After referring briefly to methods for measuring thixotropy in paints and enamels, particularly to the work of Dr. McMillen, of the University of Minnesota, the lecturer proceeded to describe his own methods. He said he had evolved an electromagnetic thixotrometer which automatically recorded a Maxwell "relaxation-time" curve for a paint immediately after stirring and after it had rested for definite time intervals. With the aid of this apparatus marked differences in the plastometric constants of a paint could be observed or recorded after it had stood for 30 or even 15 seconds after stirring. The apparatus measures on the same curve the increase in viscosity as well as the increase in rigidity and both factors are of supreme importance in the brushing and levelling properties of a paint. The apparatus clearly showed the development of elasticity in a 1.3 per cent. bentonite gel in a few seconds after shaking.

Four high grade zinc oxide enamels gave totally different sets of curves and the evidence thus obtained agreed with the brushing and levelling properties of the enamels as determined by an experienced craftsman. Other examples shown were various enamels and paints of the same composition with respect to the medium but differing only in the nature of the pigment. Curves were also shown which vindicated the claim that the addition of milled crepe rubber improves the flow of paints. Other curves showed the influence of reagents such as aluminium stearate and zinc resinate upon the consistency of paints and enamels.

Dispersion of Pigment

Though Mr. Pryce-Jones refrained from making any generalisations he was prepared to go so far as to state that all the paints he had examined displayed thixotropy to a greater or less degree. As would be expected the property is not merely so pronounced in enamels though it is invariably present in zinc oxide enamels and probably in all enamels at a sufficiently low rate of shear. It is fairly obvious from the results so far obtained that paint systems where thixotropy is not pronounced settle rapidly in the tin on storage and that marked thixotropy implies poor brushing and levelling properties. A satisfactory paint appears therefore to be a compromise—the determining properties being settlement and levelling. Further, it may be provisionally stated that hard settlements imply complete dispersion of the pigment—corresponding to a bentonite dispersed with sodium silicate whereas soft settlements imply complete precipitation—or very poor wetting; corresponding to syneresis in bentonite. Numerous paints which give a soft spongy settlement give evidence of syneresis when tested in the thixotrometer.

Wetting Power of Paint Mediums

As thixotropy is an indication of the state of dispersion or precipitation of a system the lecturer had attempted to employ thixotropy as a criterion of the "wetting power" of a medium—whatever the term may mean. The principle was illustrated by means of the very highly thixotropic paste made from two parts of non-polar paraffin and one part of zinc oxide. On adding 10 per cent. of raw linseed oil to such a paste its consistency is appreciably reduced, but it still possesses considerable rigidity and rapidly sets in the annular space of the thixotrometer. On adding 0.2 per cent. of lecithin the character of the paste is completely altered and there is very little evidence of change of viscosity or development of rigidity in twenty minutes or more. Lecithin disperses or "wets" certain pigments quite readily and the absence of thixotropy in the system is an indication of this property.

In the comparison of the "wetting properties" of two media the lecturer took three hundred grams of the paraffin zinc oxide paste and added 2.5 per cent. of a lithographic medium "A" and obtained a fairly free flowing paste which showed no evidence of thixotropy in twenty minutes. On taking the same quantities of paste and a lithographic medium "B," a paste of approximately the same viscosity was obtained, but thixotropy was apparent in thirty seconds and was very marked in five minutes. Similar differences were ob-

tained with 5 per cent. of two paint media. It would appear that this method may serve as a criterion for the comparison of "wetting power" and that the medium "A" is a more efficient dispersing or wetting agent than "B." The same principle could be extended to other pigments and the lecturer suggested that the method could be advantageously used as a simple method of controlling paint and varnish media. Further experiments in progress are an attempt to correlate the decrease in thixotropy with the polarity of the medium.

"Yield Value" in Plastic Systems

Ever since Professor Bingham originated the concept of "yield-value" in a plastic system there has been ceaseless discussion as to whether this property is anything more than an imaginary "intercept upon an axis" in the plastometric pressure/volume curve. The curves obtained with the electromagnetic thixotrometer apparently indicate the existence of "yield-value" in paints and certain enamels, but the evidence rests on being able to tell whether a line is truly horizontal or not, and that seems to be a difficulty which cannot be overcome experimentally.

The lecturer said he had designed a new method which he believed indicated the existence of a "yield-value," he had measured the minimum current required to rotate a cylinder free to move in a volume of paint; the cylinder was actuated by a magnet which rotated under the electromagnetic effect produced by the current. A zero line was first recorded on a moving photographic paper when no current passes through the system; a record of the position of the cylinder was then made on the same paper when the current was gradually and automatically increased from 25 to 50 milliamperes. On developing the paper the two lines were coincident indicating that the cylinder had not moved under the electromagnetic effect produced by 50 milliamperes. A zero line was again traced on another sheet of paper and on this occasion the current was increased from 30 to 150 milliamperes in a period of three hours. On developing the paper the two lines were coincident up to a value corresponding to 105 milliamperes where two lines were clearly seen. By converting the electromagnetic field corresponding to 105 milliamperes into dynes per square centimetre, from the known constants of the instrument the value of the "yield-value" could be calculated.

Beware of the Planner

Gravest Danger to the National Government

IN a leading article in "The Independent" of May 5, Sir Ernest Benn says National Government propaganda is the main preoccupation of many of our best minds and the novelty of the subject makes it more worth study and debate than many of the questions over which we are accustomed to argue. The National Government has never enjoyed the blessings or experienced the embarrassments of propaganda. It was born of crisis and alarm; indeed, we flew to it as the only escape from propaganda and its consequences. Being composed, as it was bound to be, of persons trained in the propagandist traditions of party strife, it has always felt a little strange and uncomfortable without these usual political crutches.

The nation said, in the plainest terms that any nation could adopt: "Saves us from the Something for Nothing philosophy which has contaminated every party, disgraced the national character, ruined the national credit and brought us to moral and economic bankrupty." That was the mandate of the National Government, and in so far as it has been faithful to it we have recovered and things are better. But that revival has been made by the people, not by the Government, and, if only the propagandist could understand it, that fact reflects more credit on the Government than anything which the Government itself could do.

"The gravest danger facing the National Government," continues Sir Ernest Benn, "is the bureaucrat's advance agent, the planner. This individual will join any party that will have him and will in time destroy it; the National party alone is strong enough, if it will only have the sense, to expose him for an expensive and destructive job-hunter. National propaganda, then, must be an appeal to the qualities and not to the weaknesses of the people. Avoiding the degrading vulgarities of the Lloyd George slogan, 'I can cure,' it must take the higher and far more attractive line, 'You can do it.' The National Government is responsible for forty-odd millions of the finest people in the world, who for centuries, of their own endeavours, have never failed to progress. Modern politics has afflicted them, developed the pauper mind, magnified the State and encouraged an inferiority complex in the individual. The National Government was elected to bring us back to ourselves. If propaganda is based on these ideas, it will speed up the marvellous recovery already commenced. If, on the other hand, it follows the discredited lines of any modern party propaganda it will fail, and the various menacing 'isms of which we talk will, one after the other, slowly destroy civilisation."

British Oxygen Company

A Rapid Development for Liquid Oxygen

THE forty-eighth annual general meeting of the British Oxygen Co., Ltd., was held in London, on May 3, when Dr. J. Donald Pollock, the chairman, presided.

The profit and loss account, said Dr. Pollock, showed a balance of profit from all sources of £184,898, as compared with £100,241 in the previous year, which figure, however, included a non-recurring item of £7,306 representing the profit derived from the sale of certain Government securities and reinvestment of the proceeds in others. After allowing for this fortuitous profit, the profits for last year exceeded those for the previous year by £91,963, or an increase of approximately 99 per cent. Issued ordinary stock at the end of the year totalled £1,519,091, as compared with £1,194,091 at the end of the previous year, when, however, an obligation existed to issue 325,000 ordinary shares of £1 each in payment of assets acquired. The value of interests in subsidiary companies has not materially altered during the year, but the £100,000 obtained since the close of the accounts from the option exercised has been usefully employed in the purchase of additional shares in subsidiary companies in British Dominions overseas.

With reference to oxygen business, the company has been engaged during the past year in extending the manufacture and distribution of oxygen in the liquid form. Apart from the supply of it from their large production plants direct to the consumers' works, they have already, to a certain extent, been able to transport it in large quantities to several of their smaller gaseous oxygen factories thereby enabling the latter to close down as producing works, whilst being retained for local distribution of the gasified liquid. The company hopes to carry out this policy much further and when they are in the position to produce larger quantities of liquid oxygen more of the existing works will be similarly transformed.

During the past year the company has also been engaged in experimental and research work towards the further improvement in the construction of vessels for the storage and transport of liquid oxygen.

Service to Compressed Gas Users

Plants throughout the country for the production of other gases, such as hydrogen, nitrogen, carbon dioxide, nitrous oxide, argon, neon, and heliuum, have been maintained in an efficient condition, and it has been found necessary to increase facilities for their production. In order to meet the increasing demand for dissolved acetylene additional manufacturing plant has also been installed at several of the company's dissolved acetylene compressing stations.

The company has spent large sums of money in developing their service system to customers throughout the country, and the board are of opinion that it is impossible too strongly to emphasise the importance of this side of the company's work, which is increasing and will continue to increase. Although the sales of oxygen and dissolved acetylene have surpassed any previous records, with the prospect of still further improvement in trade the company now looks forward to a further increase in the volume of sales this year. With a few minor exceptions every one of the company's products shows increase of sales approximately proportionate to the increase of sales of oxygen and dissolved acetylene.

Notes and Reports from the Societies

The Chemical Society

Forthcoming Papers

AN ordinary scientific meeting of the Chemical Society will be held at Burlington House on Thursday, May 17, at 8 p.m., when the following papers will be read:—" Separation of the Isotopes of Hydrogen by the Chemical Decomposition of Water, and some remarks on the mechanisms underlying the reducing action of dissolving metals " (E. D. Hughes, C. K. Ingold and C. L. Wilson). " On some Reactions with Heavy Water" (A. H. Hughes, J. Yudkin, I. Kemp and E. K. Rideal). "The Catalytic Hydrogenation of Simple Molecules by Heavy Hydrogen" (H. W. Melville). " The Isotope Ratio in Hydrogen: a general survey by precise density comparisons upon water from various sources " (H. J. Emeléus, F. W. James, A. King, T. G. Pearson, R. H. Purcell and H. V. A. Briscoe).

Visit to Chemical Research Laboratory

The last ordinary scientific meeting of the session will be held, by invitation of the President, at the Chemical Research Laboratory, Teddington, Middlesex, on Thursday, June 7. At 3 p.m., a discussion on " Chemical Syntheses under Pressure " will be held, to which papers will be contributed as follows:—Mr. R. Taylor: " Catalytic Syntheses with Carbon Monoxide and Hydrogen under Pressure." Dr. D. V. N. Hardy: " Interaction of Methyl Alcohol and Carbon Monoxide: Syntheses of Acetic Acid." Dr. D. D. Pratt: " Condensations and Aminations under Pressure." At the conclusion of the meeting, tea will be served and visits to the laboratories arranged. Fellows intending to be present should notify the assistant secretary not later than Friday, May 25, so that the necessary arrangements may be made.

Society of Glass Technology

Annual Meeting

THE annual general meeting of the Society of Glass Technology was held in Sheffield on April 18, when Mr. G. V. Evers was re-elected president for the ensuing year. To fill vacancies due to retirement the following were also elected: Vice-presidents: F. G. Clark, F. G. Orme; ordinary members of Council: Miss V. Dimbleby, F. E. Lamplough, A. L. Marden, J. H. Partridge, H. S. Williams-Thomas. Re-elections to office included general treasurer, B. P. Dudding; American treasurer, F. C. Flint; secretary, Professor W. E. S. Turner.

Iron Oxide Free from Sodium Carbonate

A note on the preparation of sodium carbonate free from iron oxide was presented by Mr. W. H. Withey, who pointed out that in the determination of small quantities of iron in glasses, sands, etc., involving fusion with sodium carbonate, it is essential that this flux be as free as possible from iron. The anhydrous reagent procurable often contains small quantities of material rich in iron, and it is necessary to make an aqueous solution, filtering off this insoluble matter. In the subsequent crystallisation and dehydration difficulties are met, and a new and better procedure was therefore devised. An aqueous solution of the commercial anhydrous carbonate is made, filtered, and then treated warm with alcohol. After two alcohol treatments the monohydrate is produced, and this can be readily converted to the anhydrous state at a temperature not above 250°. Any soluble iron present is removed by treating the filtered solution with $KMnO_4$ solution and a little ammonia, and alcohol. After filtering again, the solution is treated with alcohol, to produce the monohydrate which is then dried further.

The development of mechanical methods of glass manufacture in Europe was the subject of a paper by Professor W. E. S. Turner, who said that the first real attempts at using machinery were made in this country.

Society of Public Analysts

Election of New Members

AN ordinary meeting of the Society of Public Analysts was held at the Chemical Society's Rooms, Burlington House, on May 2, the president, Mr. John Evans, being in the chair. Certificates were read in favour of J. F. Brown, C. E. Resch, W. Smith and S. G. E. Stevens. The following were elected members of the Society: F. F. Beach, T. G. Elliot, F. J. Flowerdew, J. A. Heald, F. E. Needs and D. J. Saxby.

Crystallisation of Cocoa Butter

A new apparatus for determining the temperature of crystallisation of cocoa butter was described by Mr. S. A. Ashmore, B.Sc., A.I.C. The temperature at which separation of solid fat occurs is a constant for each fat. With the new apparatus this temperature can be determined with rapidity and precision on as little as 2 g. of fat. The Tyndall effect has been utilised by projecting a beam of light through a small tube containing the melted fat suitably enclosed in a darkened chamber; as soon as any separation of solid particles occurs, a scattering of light takes place, and the tube appears luminous against the darkened background. The temperature at which this is first seen is noted and termed the crystallisation temperature; for cocoa butter it has proved to be a valuable criterion of purity.

Determination of Germanium

The determination of small quantities of germanium in the presence of arsenic was the subject of a paper by Mr. S. A. Coase, B.Sc. In the electrolytic reduction of germanium dioxide to monogermane the author showed that the yield of gas is greatest when (i) the cathode is of nickel, (ii) the alkalinity of the solution is low, (iii) the current density is high. By using the electrolytic March test with a standardised apparatus, 0.027 mg. of germanium dioxide can be detected. This method is thus more suitable than any other described and can be used for the determination of small quantities of germanium (0.027 to 0.1 mg.). It has been shown that arsenates are not reduced under similar conditions, and hence the method can be used for the determination of germanium in the presence of arsenic.

Society of Chemical Industry

American Section: Bermuda Water Supplies

THE system which supplies the islands of Bermuda with fresh water was the subject of discussion at a meeting of the American Section of the Society of Chemical Industry, held jointly with the American Chemical Society, the Electrochemical Society and the Société de Chimie Industrielle at the Chemists' Club, New York, on May 4. Dr. W. D. Turner, of Columbia University, who developed the system, presented a paper entitled " The Bermuda Waterworks," in which he described the special installation made necessary by the soil conditions peculiar to the islands. Until 1929 Bermuda had to depend entirely for fresh water on importations from New York or on rain water collected from the roofs or specially constructed catchments. This was necessary because no method had been found to collect underground fresh water without salt contamination from the sea water which permeated the coral structure of the islands.

Dr. Turner, on a visit to the islands, conceived the idea of applying horizontal well or infiltration galleries for collecting the surface waters. The system produced water free from salt but very hard, due to percolation through the coral sandstone. This system was therefore supplemented by an extensive softening process, and the resultant soft, fresh, pure water is now being produced and distributed throughout the colony in a complete system of asbestos water mains designed

to be resistant to the serious corrosion conditions existing in these sub-tropical sea islands.

Mr. S. B. Applebaum, of the Permutit Co., described the water softening process used, and Mr. P. D. Mallay, of the Johns Manville Co., gave details concerning asbestos water mains.

Institute of Metals

May Lecture : Gases and Metal Surfaces

PROFESSOR E. K. RIDEAL, F.R.S., of Cambridge University, delivered the twenty-fourth annual May lecture of the Institute of Metals in London on May 9, on " Gases and Metal Surfaces." Professor Rideal said that the reactions of gases with metals are important not only in metallurgy but also in a number of important chemical reactions, especially those termed catalytic such as are involved in the production of synthetic ammonia or fuel oil. From a study of the adsorption of gases by metals we can obtain some idea of the structure of the surface of the metal and we find that metals do, in fact, contain numerous fissures and holes which affect the physical properties of the metal.

Gases can be held on to metal surfaces by at least two distinct methods, one by a purely physical attractive force and the other where a species of chemical combination takes place between gas and metal. Each of these combinations possesses characteristic properties which can be examined and the conditions of the conversion of one form with the other can be explored. Adsorbed gases can move over the surface of metals by process of activated migration, analogous to hopping and this hopping is found to play an important part in rates of reaction at surfaces. Metallic vapours, when condensed as sponges, possess remarkable properties which eventually disappear as the sponge collapses.

The Lancashire Coalfield

Examination of Seven Seams

PROVED coal resources amounting to over 4,000,000,000 tons are estimated to be available in the Lancashire coalfield, which covers roughly a triangular area 500 square miles in extent, from Burnley in the north to Prescot in the west and Stalybridge in the east. As part of the physical and chemical survey of our national coal resources, which aims at providing the information necessary for their utilisation to the best advantage, the Department of Scientific and Industrial Research has published a report on the miscellaneous seams of the lower coal measures of this area (Fuel Research Survey Paper 32 : " The Lancashire Coalfield. Miscellaneous Seams of the Lower Coal Measures." H.M. Stationery Office, 2s. net). The report gathers together the results of the examination of 19 somewhat scattered samples from seven distinct seams.

Laboratory Selection

In the district considerable difficulties have for long existed regarding the identification and correlation of the various seams, and the naming of the seams has been in a state of great confusion. By active co-operation with the Geological Survey of Great Britain, this difficulty has been overcome, and a section on the correlation of the seams prepared by the survey is included in the report. The selection of the coal samples and their analysis was carried out for the Department in the laboratories of the Lancashire and Cheshire Coal Research Association, under the general direction of the Survey Committee for this area and under the supervision of Mr. N. Simpkin, Director of Research to the Association.

The seams were examined by means of pillar samples cut from the coal in situ and representing the seam from floor to roof. Each was subjected to proximate and ultimate analysis, and determinations were made of sulphur, phosphorus, calorific value, melting point of the coal ash and caking index. In the majority of cases a carbonisation assay was carried out, using the Gray-King apparatus.

Chemical Imports in India

A Reduction During the Last Half-Year

A SURVEY of the import trade of India for the first half of the present fiscal year, prepared by the senior British Trade Commissioner in India and issued by the Department of Overseas Trade, shows that imports of chemicals have hitherto been remarkably well maintained during the period of general depression, but showed a total reduction during the half-year from Rs.141½ lakhs* to Rs.126½ lakhs, mainly on account of reduced imports of sodium carbonate and sulphur. No details are available of the countries of origin but the following table gives particulars of the total imports under each of the principal headings :—

	1932-33. Rs. (lakhs).	1933-34. Rs. (lakhs).
Acids	4	3¾
Bleaching powder	5¾	4½
Carbide of calcium	3¾	3¼
Copper sulphate	1½	1¼
Disinfectants	3¼	3¼
Glycerine	1¾	1½
Potassium chlorate	5½	6¼
Sodium bicarbonate	3¾	3½
,, bichromate	2	1¾
,, carbonate	36½	29¾
,, cyanide	1¾	1¼
Caustic soda	18	16¾
Sodium sulphite	2¼	1
Sulphur (brimstone)	9½	8½

Lubricating Oils

The total imports of lubricating oils (excluding batching oils in which the United Kingdom is not interested) rose from 3,640,422 gal. valued at Rs.47½ lakhs to 4,780,223 gal. valued at Rs.48 lakhs. The share of the United Kingdom, mainly due to the preferential margin of two annas per gallon and also to improved marketing organisation, rose from 615,052 gal. (Rs.8½ lakhs) to 1,185,689 gal. (Rs.13 lakhs). The share of the United States on the other hand, rose in quantity from 2,808,401 gal. to 3,226,388 gal., but fell in value from Rs.37 lakhs to Rs.32½ lakhs. The statistics show that, owing to the need for economy, there has been marked substitution of the cheaper qualities.

The total imports of drugs and medicines receded slightly from Rs.83.57 lakhs to Rs.83.44 lakhs due to reduced imports of camphor and proprietary and patent medicines. On the other hand, arrivals of quinine salts advanced from Rs.11½ lakhs to Rs.14¼ lakhs. Details of the countries of origin are not available, but the following represent the total imports in each of the principal items :—

	1932-33. Rs. (lakhs).	1933-34. Rs. (lakhs).
Camphor	12	11
Proprietary and patent medicines ...	17¾	15¾
Quinine salts	11½	14¼
Saccharine	1¾	1½
Unenumerated items	39¼	39¾

Coal Tar Dyestuffs

A still further heavy reduction is to be recorded in the total imports of dyes obtained from coal tar for the half-year from 8,172,929 lb. valued at Rs.129 lakhs to 5,293,585 lb. valued at Rs.89¼ lakhs. The reduction was spread over most types of dyes. Details of the countries of origin are not yet available.

The total trade in paints and colours rose quantitatively from 152,012 cwt. to 195,191 cwt., but fell slightly in value from Rs.33.25 lakhs to Rs.31.19 lakhs. The United Kingdom share rose from 76,991 cwt. to 82,653 cwt. and from Rs.20½ lakhs to Rs.21½ lakhs. On the other hand, arrivals from Germany rose in quantity from 19,130 cwt. to 34,810 cwt., but fell in value from Rs.4½ to Rs.4 lakhs, whereas imports from Japan fell from 24,376 cwt. (Rs.3.3 lakhs) to 20,799 cwt. (Rs.2.6 lakhs). Imports from the U.S.A. rose in quantity from 2,254 cwt. to 2,483 cwt., but fell in value from Rs.1¼ lakhs to Rs.1 lakh

* Rupees one lakh (Rs.100,000) = £7,500 at 1s. 6d. exchange.

News from the Allied Industries

Matches

THE SWEDISH MATCH CO. has announced that the factory at Annenberg and the two smallest factories at Linkoaping will be closed down, while the workers at other factories will be reduced by 15 per cent. At the same time the working week, which is now three days, will be increased.

Dry Cleaning

A NET LOSS, after depreciation and debenture interest, of £18,061 is reported by Achille Serre, Ltd., dyers and cleaners, for 1933. This is a smaller loss than for 1932, the improvement being due to a further reduction in costs and to better trading conditions in the latter part of the year. The accumulated debit balance carried forward on profit and loss account is now £62,347. No allocation has been made to the debenture sinking fund (against £3,633), as debenture holders on November 30 last agreed to the suspension of the sinking fund for three years. The dividend on the £120,000 of 6 per cent. preference capital is in arrear as from April 1, 1929. The auditors mention that the loss incurred on the sale of part of the old works at Hackney Wick has been transferred to a capital suspense account (entered in the balance sheet at £18,378), and state that no provision has been made for any further loss that may be incurred on the sale of the balance of these works.

Laundry

AN EXHIBITION OF MACHINERY, plant, appliances, supplies, and services available for the use of the commercial launderer was opened by Sir John Gilmour at the Royal Agricultural Hall, London, on May 7. Mr. T. Boyd, president of the National Federation of Launderers, said the federation had spent £80,000 and were spending £8,000 annually on research to enable them to reduce to the absolute minimum damage to articles entrusted to them. They had also a scheme of technical education with scholarships. They were the fourth largest employers of female labour in the country and, with improved and perfected services, would probably soon take first place.

Paint and Varnish

SPEAKING AT THE FOURTEENTH ANNUAL GENERAL MEETING of Paripan, Ltd., held in London, on May 7, Mr. E. B. Montesole, J.P., the chairman, said it was pleasing to record an improvement in the net profits of no less than 42½ per cent. when compared with the previous period, and this had enabled the board confidently to recommend the restoration of the dividend to a distribution of 15 per cent. for the year. A portion of the increased trade had been due to the great expansion of new building schemes, and he believed that they were by no means at the end of these developments.

Continental Chemical Notes

BY ALLOCATING FIVE MILLION MARKS for loans to oil prospecting companies, the German Government is actively collaborating in efforts to reduce oil imports.

* * *

FURTHER OIL DRILLING OPERATIONS in the Nienhagen oilfield in Prussia, have resulted in the discovery of a well yielding 20 tons crude oil per day. It is said, however, that the oil is brine-contaminated.

* * *

AN OFFICIAL SWEDISH REPORT on the Russian wood pulp project in northern territories, quoted in the "Chemiker-Zeitung," speaks of the impending erection of the long-planned cellulose factory near Archangelsk (White Sea coast) with an annual output of 100,000 tons, the greater part of which is allocated for export.

* * *

SNIA VISCOSA, the largest Italian rayon concern, slightly increased its net profit in 1933 from 22.3 to 23 millions lire. A programme of modernisation in respect of all sections of the plant is to be carried out during the present year. The re-modelled factory at Magenta will find employment for 1,000 workers from the coming June.

* * *

FRENCH MACHINERY MANUFACTURERS are actively participating in plans for a synthetic nitrogenous fertiliser plant to be erected at Shanghai, according to press reports quoted in "Metallbörse." If the report is well-founded, the project will not be without repercussion upon the German nitrogen industry, China being the third largest customer for German ammonium sulphate, taking 58,000 tons in 1933.

* * *

EVIDENCE OF REVIVAL in the Ruhr sulphuric acid industry is furnished by the re-starting of the plant of the Chemische Industrie A.G., at Bochum, after being completely idle for four years. With an annual output of 50,000 tons, as now contemplated, the plant will be utilised to one-third of the full capacity. Another encouraging sign in this department of the heavy chemical industry is disclosed by the forthcoming expansion of the present 90,000 tons annual output of the Curtius concern, at Duisburg, to the maximum figure of 130,000 tons.

THE NEWLY ERECTED GELATINE FACTORY of Dansk Gelatine A.S., at Copenhagen, has a daily output of about 650 lb. of gelatine. Waste products from pig slaughter houses form the main raw material.

* * *

AN EXPERIMENTAL OIL SHALE PLANT has been erected, with the assistance of the Swedish Government, in the southern province of Vaistergötland where the Kinnekulle mountains are believed to offer possibilities as a source of oil fuel.

* * *

SYNTHETIC NEATSFOOT OIL as a textile assistant and for other uses can be obtained (according to German Patent 567,618) by esterifying the fatty acids of sperm oil. After removal of fatty alcohols, the acids are cooled to 4° C. and the liquid fraction, separated by filtration, is esterified with glycerine to give a triglyceride freezing at −20° C.

* * *

A NEW FACTORY PUT INTO OPERATION by the French concern, the Compagnie de Bethune, will utilise ammonia for sodium nitrate manufacture through intermediary formation of nitric acid. According to the 'Chemiker-Zeitung," the plant is capable of dealing with 20 tons of ammonia per day, which substance is also among the wide range of products manufactured by the company.

* * *

FOLLOWING TWO YEARS OF SYSTEMATIC RESEARCH the Etablissements Kuhlmann claim to have evolved a boiler compound with universal applicability to heating plants. It is stated to fulfil the essential condition of impassivity towards metals whilst functioning as an acid relative to the salts constituting boiler scale. Large-scale manufacture renders the new product available to industry at an economic price.

* * *

IN CONNECTION WITH ACTIVITIES in the French oil shale industry, the "Metallbörse" quotes from a report on the preliminary working of the Société des Schistes et Pétroles de Franche-Comte which started operations at Creveney in October last. It is stated that 3,000 tons of oil shale are distilled per day in four ovens (Petit system) and yield 6,000 kg. benzine, 9,000 kg. gasoline, 2,000 kg. heavy oil and 3,000 kg. tar.

A PROCESS FOR EXTRACTING GUM ARABIC from forest trees of Northern Russia has been developed, reports the "Chemische Industrie." In consequence, a factory with a contemplated annual output of 200 tons is under construction at Njandoma on the Northern Railway.

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THE NEW ILJIN PROCESS of linseed expression described by R. Heublum in "Fettchemische Umschau," 1934, No. 3, p. 53, involves treatment with saturated steam for several minutes in a thin layer followed by expression under the comparatively low pressure of 25 atmospheres.

* * *

THE SOCIETY OF CHEMICAL INDUSTRY IN BALE (Ciba) announces a 15 per cent. dividend (unchanged) for 1933. The chief points emphasised in the annual report are the setback to the output of the indigo section owing to competition of countries (United States and Japan) with depreciated currencies; and the creation of a plastics department at the Klein-Hüningen works, where also the manufacture of textile assistants has now been concentrated.

* * *

HUNGARIAN DEPENDENCE UPON IMPORTED SODA may shortly disappear if the negotiations for establishment of a plant operating the ammonia soda process reported to be in progress between the Manfred Weiss concern and the Hungaria Artificial Fertiliser, Sulphuric Acid and Chemical Industry Co., are satisfactorily concluded. According to "Metallbörse" the 1933 importation of this product was approximately 1,200 wagon loads, valued at 2.5 million pengö.

Activity in Chemical Invention

Trends in 1933

THE Comptroller-General of Patents, Designs, and Trade Marks, states in the fifty-first report on the work of his Department, covering the year 1933 (H.M. Stationery Office, 4d.) that during the year there was an increase in activity in chemical invention, but it is too early to determine whether this is an indication of a general increase. In the last boom in patents, however, it was the chemical subjects that were the first to show a rise and also the first to show a fall. In connection with azo dyes, the chief activity is in regard to insoluble dyes formed on the fabrics. Soluble metal compounds of azo dyes for dyeing wool, insoluble dyes for colouring rubber, and cyanine dyes for further enhancing the light sensitivity of photographic emulsion are receiving considerable attention. Activity continues in connection with the destructive hydrogenation of carbonaceous materials, and attention is being paid to the use of normally gaseous hydrocarbons and other liquefied gases for the separation and purification of hydrocarbon oils. The prepartion and purification of salts, on a commercial scale, by means of base-exchange bodies is an interesting development. The isolation of sexual and other hormones from animal tissues and liquids has permitted the preparation of crystalline bodies, the chemical structure of which is being investigated and brought into use for the preparation of pure crystalline hormones. Much attention is being paid to the canning, packing, and handling of foodstuffs, and also to the preservation of food in special gaseous atmospheres.

In the electrical field, there is steady development in connection with the use of mercury-arc and other gaseous discharge devices in place of rotating commutators and in their application to A.C. and D.C. networks. Motor control systems are being introduced in which mercury-arc rectifiers are used in place of control switches. Development in connection with the electrical precipitation of dust from gases continues.

The number of applications for patents received during the year was 36,734, as compared with 37,052 in 1932. The number of applications to register designs was 25,015, including 268 sets, as compared with 22,374, including 339 sets, in 1932. Applications for the registration of trade marks numbered 9,845, of which 9,613 were for registration in Part A of the register, and 232 in Part B. The total for the year shows a decrease of 477 as compared with 1932.

The committee appointed by the Board of Trade in January, 1933, under the chairmanship of Viscount Goschen, to consider and report whether any, and if so what, changes in the existing law and practice relating to trade marks are desirable, continued its sittings in 1933, and completed the taking of evidence in July. It is now considering its report. The conference of the International Union for the Protection of Industrial Property, which was to have been held in London during 1933, for the revision of conventions, did not take place during the year, mainly on account of the fact that a number of countries of the Union have not yet acceded to the instruments adopted at the last conference which was held at the Hague in 1925. It has now been decided that further delay is undesirable, and the conference has been convened for May 1 next. Invitations to be represented have been sent to all countries of the Union, to a number of countries outside the Union, and to two committees of the League of Nations.

United States Sulphur Industry

Advance Statistical Summary for 1933

PRODUCTION, shipments, and exports of sulphur from the United States in 1933 showed large increases in comparison with 1932. According to the Bureau of Mines, production was 58 per cent., shipments 48 per cent., and exports 48 per cent. higher in 1933 than in 1932, but they were 29 per cent., 9 per cent., and 10 per cent. respectively below the averages for the 5-year period 1928-1932. Shipments exceeded production; consequently the stocks at the mines were reduced.

Sulphur output amounted to 1,406,063 long tons in 1933, a gain of 58 per cent., compared with the output in 1932 of 890,440 tons. Shipments increased from 1,108,852 tons, valued at about $20,000,000 in 1932, to 1,637,368 tons, valued at about $29,500,000 in 1933, or 48 per cent. in both quantity and value. Stocks at the mines on December 31, 1933, had decreased to 2,799,950 tons, or 231,310 tons below the reserve at the close of the preceding year.

The new property of the Freeport Sulphur Co., in Plaquemines Parish, Louisiana, was put into operation during the year. A production of 17,705 long tons was reported by this company, but no shipments were made. The Jefferson Lake Oil Co., Inc., in Iberia Parish, Louisiana, increased its production from 13,401 tons in 1932, to 303,787 tons in 1933.

Texas produced 1,083,445 tons of sulphur in 1933, or 77 per cent. of United States total. In 1932 Texas produced 876,204 tons, 98 per cent. of the total. The combined production of sulphur in California and Utah amounted to 1,126 long tons in 1933. The average quoted price for sulphur as reported by the trade journals was unchanged at $18 a ton f.o.b. mines throughout the year. Spot prices for car lots were $21 a ton and prices for sulphur exported were given as $22-$25 per ton f.a.s. Atlantic ports.

Exports of sulphur or brimstone in 1933 totalled 522,515 long tons, compared with 352,610 tons in 1932, an increase of 48 per cent. Exports to all the countries that receive important quantities of American sulphur, with the exception of those to Australia and New Zealand, showed increases. Australia and New Zealand received much larger quantities of sulphur from the United States in 1932 than in 1931, while the other important consuming countries showed large decreases. Canada received 122,954 tons in 1933 (compared with 95,800 tons in 1932); France, 84,093 tons (60,591 tons); Germany, 69,139 tons (31,275 tons); United Kingdom, 47,149 tons (18,129 tons); Australia, 37,726 tons (60,809 tons); Netherlands, 27,449 tons (13,959 tons); New Zealand, 26,446 tons (33,654 tons). Shipments of United states sulphur to the United Kingdom in 1933 were the largest ever recorded.

Exports of crushed, ground, refined, sublimed and flowers of sulphur in 1933 were 19,629,405 lb., an increase over the 16,285,095 lb. exported in 1932. The principal importing countries were Canada with 5,161,960 lb.; Australia, 2,316,670 lb.; Germany, 2,016,392 lb.; United Kingdom, 1,452,058 lb.; Mexico, 1,153,116 lb.; and Uruguay, 1,013,600 lb.

IMPORTS of naphthenic acid into the United States through the New York customs district increased in 1933 to 256,763 lb., valued at $9,128, from 16,003 lb. valued at $719 in 1932. Incoming shipments in 1933 originated in Rumania, while those in 1932 were from Germany.

Weekly Prices of British Chemical Products

Review of Current Market Conditions

A STEADY tone has been maintained in chemical market conditions during the week, but business has only been on moderate lines. An improved inquiry for caustic potash has continued, and there has been fair activity in formic acid, oxalic acid, formaldehyde, acetone, anhydrous ammonia, lithopone and salammoniac. Keen competition has prevailed in the arsenic market, where conditions are unsettled. In the coal tar products market there have been reductions in the prices of toluol and xylol, and business generally has shown some improvement, although sales of refined coal tar have not been altogether satisfactory for the time of the year. Increased business in pharmaceutical chemicals is reported, although most orders are still for small quantities. Aspirin, bromides and hexamine have been in quite good demand. More interest has been shown in ammonium benzoate and hydroquinone. The essential oils market is not very active and a number of products have been reduced in price, including bergamot, Bourbon geranium and Wayne County peppermint.

LONDON.—Continual steadiness in practically all sections of the market is reported. Prices, with practically no exceptions, are firm. The import duty on commercial whitelead acetate has been increased from 15 per cent. to 25 per cent. ad valorem. The coal tar products market continues firm and prices are unchanged from last week.

MANCHESTER.—The persistent weakness of the copper and lead markets is having an adverse effect on the price movements of the various compounds of the metals, but in most other respects the chemical market remains steady and few actual changes have occurred on this centre during the past week. The demand for most of the leading alkali products this week, mainly against contracts, has been fairly satisfactory, and there has also been a quietly steady movement of the potash products—caustic and carbonate, with the heavy acids reported to be in moderate request. In most directions trade continues fairly active so far as the movement into consumption is concerned, but the immediate prospects in front of the textile finishing and dyeing trades are not too bright at the moment. With regard to the by-products market, carbolic acid remains easy in tendency, but there has been little actual alteration in other directions compared with a week ago.

SCOTLAND.—Business generally continues to improve in the Scottish heavy chemical market.

General Chemicals

ACETONE.—LONDON: £65 to £68 per ton; SCOTLAND: £66 to £68 ex wharf, according to quantity.

ACID, ACETIC.—Tech. 80%, £38 5s. to £40 5s.; pure 80% £39 5s.; tech., 40%, £20 5s. to £21 15s.; tech., 60%, £28 10s. to £30 10s. LONDON: Tech., 80%, £38 5s. to £40 5s.; pure 80%, £39 5s. to £41 5s.; tech., 40%, £20 5s. to £22 5s.; tech., 60%, £29 5s. to £31 5s. SCOTLAND: Glacial 98/100%, £48 to £52; pure 80%, £39 5s.; tech. 80%, £38 5s. d/d buyers' premises Great Britain. MANCHESTER: 80%, commercial, £39; tech. glacial, £52.

ACID, BORIC.—Granulated commercial, £26 10s. per ton; powder, £28 10s. in 1-cwt. bags d/d free Great Britain in 1-ton lots upwards.

ACID, CHROMIC.—10½d. per lb., less 2½%, d/d U.K.

ACID, CITRIC.—LONDON: 9½d. per lb.; less 5%. MANCHESTER: 9½d. to 9¾d.

ACID, CRESYLIC.—97/99%, 1s. 8d. to 1s. 9d. per gal.; 98/100%, 2s. to 2s. 2d.

ACID, FORMIC.—LONDON: £45 per ton.

ACID, HYDROCHLORIC.—Spot, 4s. to 6s. carboy d/d according to purity, strength and locality. SCOTLAND: Arsenical quality, 4s.; dearsenicated, 5s. ex works, full wagon loads.

ACID, LACTIC.—LANCASHIRE: Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £48; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £53; edible, 50% by vol., £41. One-ton lots ex works, barrels free.

ACID, NITRIC.—80° Tw. spot, £18 to £25 per ton makers' works, according to district and quality. SCOTLAND: 80°, £23 ex station full truck loads.

ACID, OXALIC.—LONDON: £47 17s. 6d. to £57 10s. per ton, according to packages and position. SCOTLAND: 98/100%, £48 to £50 ex store. MANCHESTER: £49 to £53 ex store.

ACID, SULPHURIC.—SCOTLAND: 144° quality, £3 12s. 6d.; 168°, £7; dearsenicated, 20s. per ton extra.

ACID, TARTARIC.—LONDON: 1s. per lb. SCOTLAND: B.P. crystals, 11d., carriage paid. MANCHESTER: 1s. 0½d.

ALUM.—SCOTLAND: Lump potash, £8 10s. per ton ex store.

ALUMINA SULPHATE.—LONDON: £7 10s. to £8 per ton. SCOTLAND: £7 to £8 ex store.

AMMONIA, ANHYDROUS.—Spot, 10d. per lb. d/d in cylinders. SCOTLAND: 10d. to 1s. containers extra and returnable.

AMMONIA, LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM BICHROMATE.—8d. per lb. d/d U.K.

AMMONIUM CARBONATE.—SCOTLAND: Lump, £30 per ton; powdered, £33, in 5-cwt. casks d/d buyers' premises U.K.

AMMONIUM CHLORIDE.—£37 to £45 per ton, carriage paid. LONDON: Fine white crystals, £18 to £19. (See also Salammoniac.)

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

ANTIMONY OXIDE.—SCOTLAND: Spot, £26 per ton, c.i.f. U.K. ports.

ANTIMONY SULPHIDE.—Golden 6½d. to 1s. 1½d. per lb.; crimson, 1s. 3d. to 1s. 5d. per lb., according to quality.

ARSENIC.—LONDON: £16 10s. c.i.f. main U.K. ports for imported material; Cornish nominal, £22 10s. f.o.r. mines. SCOTLAND: White powdered. £23 ex wharf. MANCHESTER: White powdered Cornish, £21 at mines.

ARSENIC SULPHIDE.—Yellow, 1s. 5d. to 1s. 7d. per lb.

BARIUM CHLORIDE.—£11 per ton.

BARYTES.—£7 to £8 10s. per ton.

BISULPHITE OF LIME.—£6 10s. per ton f.o.r. London.

BLEACHING POWDER.—Spot 35/37% £7 19s. per ton d/d station in casks, special terms for contract. SCOTLAND: £8 in 5/6 cwt. casks for contracts over 1934/1935.

BORAX, COMMERCIAL.—Granulated, £15 10s. per ton; powder, £17 packed in 1-cwt. bags, carriage paid any station Great Britain. Prices are for 1-ton lots and upwards.

CADMIUM SULPHIDE.—2s. 7d. to 2s. 11d.

CALCIUM CHLORIDE.—Solid 70/75% spot, £5 5s. per ton d/d station in drums.

CARBON BISULPHIDE.—£30 to £32 per ton, drums extra.

CARBON BLACK.—3½d. to 5d. per lb. LONDON: 4½d. to 5d.

CARBON TETRACHLORIDE.—£41 to £46 per ton, drums extra.

CHROMIUM OXIDE.—10¾d. per lb., according to quantity d/d U.K. Green, 1s. 2d. per lb.

CHROMETAN.—Crystals, 3¼d. per lb. Liquor, £19 10s. per ton d/d.

COPPERAS (GREEN).—SCOTLAND: £3 15s. per ton, f.o.r. or ex works.

CREAM OF TARTAR.—LONDON: £3 19s. per cwt.

DINITROTOLUENE.—66/68° C., 9d. per lb.

DIPHENYLGUANIDINE.—2s. 2d. per lb.

FORMALDEHYDE.—LONDON: £27 per ton. SCOTLAND: 40%, £28 ex store.

LAMPBLACK.—£45 to £48 per ton.

LEAD ACETATE.—LONDON: White, £34 10s. per ton; brown, £1 per ton less. SCOTLAND: White crystals, £33 to £35; brown, £1 per ton less. MANCHESTER: White, £32 to £34; brown, £31.

LEAD NITRATE.—£28 per ton. MANCHESTER: £27 10s. to £28.

LEAD, RED.—SCOTLAND: £25 10s. to £28 per ton d/d buyer's works.

LEAD, WHITE.—SCOTLAND: £39 per ton, carriage paid. LONDON: £37 10s.

LITHOPONE.—30%, £17 10s. to £18 per ton.

MAGNESITE.—SCOTLAND: Ground calcined, £9 per ton, ex store.

METHYLATED SPIRIT.—61 O.P. Industrial, 1s. 6d. to 2s. 1d. per gal. Pyridinised industrial, 1s. 8d. to 2s. 3d. Mineralised, 2s. 7d. to 3s. 1d. 64 O.P. 1d. extra in all cases. Prices according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

NICKEL AMMONIUM SULPHATE.—£49 per ton d/d.

NICKEL SULPHATE.—£49 per ton d/d.

PHENOL.—8½d. to 9d. per lb. without engagement.

POTASH, CAUSTIC.—LONDON: £42. MANCHESTER: £37 10s.

POTASSIUM BICHROMATE.—Crystals and Granular, 5d. per lb. net d/d U.K. Discount according to quantity. Ground 5½d. LONDON: 5d. per lb. with usual discounts for contracts. SCOTLAND: 5d. d/d U.K. or c.i.f. Irish Ports. MANCHESTER: 5d.

POTASSIUM CHLORATE.—LONDON: £37 to £40 per ton. SCOTLAND: 99¾/100%, powder, £37. MANCHESTER: £38.

POTASSIUM CHROMATE.—6½d. per lb. d/d U.K.

POTASSIUM NITRATE.—SCOTLAND: Refined granulated, £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 9½d. per lb. SCOTLAND: B.P. crystals, 9d. MANCHESTER: Commercial, 8¼d. to 8¾d., according to quantity inh 2-cwt. drums; B.P., 9d. to 9¾d.

POTASSIUM PRUSSIATE.—LONDON: 8¼d. to 8¾d. per lb. SCOTLAND: Yellow spot material, 8¼d. ex store. MANCHESTER: Yellow, 8¼d.

RUPRON (MINERAL RUBBER).—£16 10s. per ton.

SALAMMONIAC.—First lump spot, £41 17s. 6d. per ton d/d in barrels.

SODA ASH.—58% spot, £5 15s. per ton f.o.r. in bags.

Soda, Caustic.—Solid 76/77° spot, £13 17s. 6d. per ton d/d station. **Scotland**: Powdered 98/99%, £17 10s. in drums, £18 5s. in casks, Solid 76/77°, £14 10s. in drums; 70/73%, £14 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts 10s. per ton less. **Manchester**: £13 5s. to £14 contracts.

Soda Crystals.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

Sodium Acetate.—£22 per ton. **London**: £23.

Sodium Bicarbonate.—Refined spot, £10 10s. per ton d/d station in bags. **Scotland**: Refined recrystallised £10 15s. ex quay or station. **Manchester**: £10 10s.

Sodium Bichromate.—Crystals cake and powder 4d. per lb. net d/d U.K. discount according to quantity. Anhydrous, 5d. per lb. **London**: 4d. per lb. net for spot lots and 4d. per lb. with discounts for contract quantities. **Scotland**: 4d. delivered buyer's premises with concession for contracts. **Manchester**: 4d. net.

Sodium Bisulphite Powder.—60/62%, £16 10s. per ton d/d 1-cwt. iron drums for home trade.

Sodium Carbonate (Soda Crystals).—**Scotland**: £5 to £5 5s. per ton ex quay or station. Powdered or pea quality 7s. 6d. per ton extra. Light Soda Ash £7 ex quay, min. 4-ton lots with reductions for contracts.

Sodium Chlorate.—£32 per ton.

Sodium Chromate.—4d. per lb. d/d U.K.

Sodium Hyposulphite.—**Scotland**: Large crystals English manufacture, £9 5s. per ton ex stations, min. 4-ton lots. Pea crystals, £15 ex station, 4-ton lots. **Manchester**: Commercial, £9 5s.; photographic, £15.

Sodium Meta Silicate.—£16 per ton, d/d U.K. in cwt. bags.

Sodium Nitrite.—**London**: Spot, £18 to £20 per ton d/d station in drums.

Sodium Perborate.—**London**: 10d. per lb.

Sodium Phosphate.—£12 10s. per ton.

Sodium Prussiate.—**London**: 5d. to 5½d. per lb. **Scotland**: 5d. to 5¾d. ex store. **Manchester**: 4¾d. to 5¾d.

Sodium Silicate.—140° Tw. Spot £8 per ton d/d station, returnable drums.

Sodium Sulphate (Glauber Salts).—£4 2s. 6d. per ton d/d. **Scotland**: English material £3 15s.

Sodium Sulphate (Salt Cake).—Unground Spot, £3 15s. per ton d/d station in bulk. **Scotland**: Ground quality, £3 5s. per ton d/d. **Manchester**: £3 5s.

Sodium Sulphide.—Solid 60/62% Spot, £10 15s. per ton d/d in drums; crystals 30/32%, £8 per ton d/d in casks. **Scotland**: For home consumption, Solid 60/62%, £10 5s.; broken 60/62%, £11 5s.; crystals, 30/32%, £8 2s. 6d. d/d buyer's works on contract, min. 4-ton lots. Spot solid 5s. per ton extra. Crystals, 2s. 6d. per ton extra. **Manchester**: Concentrated solid, 60/62%, £11; commercial, £8.

Sodium Sulphite.—Pea crystals spot, £13 10s. per ton d/d station in kegs. Commercial spot, £9 10s. d/d station in bags.

Sulphate of Copper.—**Manchester**: £14 10s. per ton f.o.b.

Sulphur.—£10 15s. per ton. **Scotland**: Flowers, £11; roll, £10 10s.; rock, £9; ground American, £10 ex store.

Sulphur Chloride.—5d. to 7d. per lb., according to quality.

Sulphur Precip.—B.P. £55 to £60 per ton according to quantity. Commercial, £50 to £55.

Vermilion.—Pale or deep, 3s. 11d. to 4s. 1d. per lb.

Zinc Chloride.—**Scotland**: British material, 98%, £18 10s. per ton f.o.b. U.K. ports.

Zinc Sulphate.—**London and Scotland**: £12 per ton.

Zinc Sulphide.—11d. to 1s. per lb.

Pharmaceutical and Fine Chemicals

The following changes in the prices of pharmaceutical, photographic and perfumery chemicals are announced:—

Amyl Cinnamic Aldehyde.—7s. 6d. per lb.

Coumarin.—8s. 6d. per lb.

Eugenol.—6s. 3d. per lb.

Iso Eugenol.—7s. 6d. per lb.

Phenyl Ethyl Alcohol.—7s. 9d. per lb.

Essential Oils

The following changes in the prices of essential oils are announced:—

Bergamot.—6s. 9d. per lb.

Bourbon Geranium.—23s. per lb.

Citronella, Java.—2s. per lb.

Lemongrass.—4s. 3d. per lb.

Peppermint, Wayne County.—11s. 3d. per lb.

Sandalwood, Mysore.—19s. per lb.

Coal Tar Products

Acid, Carbolic.—Crystals, 8½d. to 9d. per lb.; crude, 60's, 2s. 11d. to 2s. 2½d. per gal. **Manchester**: Crystals, 8d. per lb.; crude, 2s. 1d. per gal. **Scotland**: 60's, 2s. 6d. to 2s. 7d.

Acid, Cresylic.—90/100%, 1s. 8d. to 2s. 3d. per gal.; pale, 98%, 1s. 6d. to 1s. 7d.; according to specification. **London**: 98/100%, 1s. 3d.; dark, 95/97%, 11d. **Scotland**: Pale, 99/100%, 1s. 3d. to 1s. 4d.; dark, 97/99%, 1s. to 1s. 1d.; high boiling acid, 2s. 6d. to 3s.

Anthracene Oil.—Strained, 4½d. per gal.

Benzol.—At works, crude, 9d. to 9½d. per gal.; standard motor, 1s. 4d. to 1s. 4½d.; 90%, 1s. 4½d. to 1s. 5½d.; pure, 1s. 7½d. to 1s. 8d. **London**: Motor, 1s. 6½d. **Scotland**: Motor, 1s. 6½d.

Creosote.—B.S.I. Specification standard, 3½d. per gal. f.o.r. Home, 3¾d. d/d. **London**: 3d. f.o.r. North; 4d. London. **Manchester**: 3d. to 4½d. **Scotland**: Specification oils, 4d.; washed oil, 4¼d. to 4¾d.; light, 4½d.; heavy, 4¼d. to 4½d.

Naphtha.—Solvent, 90/160%, 1s. 6d. to 1s. 7d. per gal.; 95/160%, 1s. 7d. to 1s. 8d.; 99/160%, 11d. to 1s. 1d. **London**: Solvent, 1s. 3½d. to 1s. 4d.; heavy, 11d. to 1s. 0½d. f.o.r. **Scotland**: 90/160%, 1s. 3d. to 1s. 3½d.; 90/190%, 11d. to 1s. 2d.

Naphthalene.—Purified crystals, £9 15s. per ton in bags. **London**: Fire lighter quality, £3 to £3 10s.; 74/76 quality, £4 to £4 10s.; 76/78 quality, £5 10s. to £6. **Scotland**: 40s. to 50s.; whizzed, 70s. to 75s.

Pitch.—**London**: £2 17s. 6d. to £3 per ton f.o.b. East Coast port.

Pyridine.—90/140, 5s. 9d. to 7s. per gal.

Toluol.—90%, 2s. 3d. per gal.; pure, 2s. 6d.

Xylol.—Commercial, 2s. 2d. per gal.; pure, 2s. 4d.

Intermediates and Dyes

Acid, Benzoic, 1914 B.P. (ex Toluol).—1s. 9½d. per lb.

Acid, Gamma.—Spot, 4s. per lb. 100% d/d buyer's works.

Acid, H.—Spot, 2s. 4½d. per lb. 100% d/d buyer's works.

Acid Naphthionic.—1s. 8d. per lb.

Acid, Neville and Winther.—Spot, 3s. per lb. 100% d/d buyer's works.

Acid, Sulphanilic.—Spot, 8d. per lb. 100% d/d buyer's works.

Aniline Oil.—Spot, 8d. per lb., drums extra, d/d buyer's works.

Aniline Salts.—Spot, 8d. per lb. d/d buyer's works, casks free.

Benzaldehyde.—Spot, 1s. 8d. per lb., packages extra.

Benzidine Base.—Spot, 2s. 5d. per lb. 100% d/d buyer's works.

Benzidine, HCL.—2s. 5d. per lb.

***p*-Cresol 34-5° C.**—2s. per lb. in ton lots.

***m*-Cresol 98/100%.**—2s. 3d. per lb. in ton lots.

Dichloraniline.—1s. 11½d. to 2s. 3d. per lb.

Dimethylaniline.—Spot, 1s. 6d. per lb., package extra.

Dinitrobenzene.—8d. per lb.

Dinitrochlorbenzene, Solid.—£72 per ton.

Dinitrotoluene.—48/50° C., 9d. per lb.; 66/68° C., 10½d.

Diphenylamine.—Spot, 2s. per lb., d/d buyer's works.

α-Naphthol.—Spot, 2s. 4d. per lb., d/d buyer's works.

β-Naphthol.—Spot, £78 15s. per ton in paper bags; £79 5s. in casks, in 1-ton lots.

α-Naphthylamine.—Spot, 11½d. per lb., d/d buyer's works.

β-Naphthylamine.—Spot, 2s. 9d. per lb. d/d buyer's works.

***o*-Nitraniline.**—3s. 11d. per lb.

***m*-Nitraniline.**—Spot, 2s. 7d. per lb. d/d buyer's works.

***p*-Nitraniline.**—Spot, 1s. 8d. per lb. d/d buyer's works.

Nitrobenzene.—Spot, 4½d. per lb.; 5-cwt. lots, drums extra.

Nitronaphthalene P.G.—1s. 0½d. per lb.

Sodium Naphthionate.—Spot, 1s. 9d. per lb.

***o*-Toluidine.**—9½d. per lb.

***p*-Toluidine.**—1s. 11d. per lb.

Nitrogen Fertilisers

Sulphate of Ammonia.—Home: £7 5s. per ton delivered in 6-ton lots to farmer's nearest station. Export: Nominal £5 17s. 6d. per ton f.o.b. U.K. ports in single bags.

Cyanamide.—£7 5s. per ton carriage paid to any railway station in Great Britain in lots of 4 tons and over.

Nitrate of Soda.—£7 18s. 6d. per ton delivered in 6-ton lots to farmer's nearest station.

Nitro-Chalk.—£7 5s. per ton delivered in 6-ton lots to farmer's nearest station.

Concentrated Complete Fertilisers.—£10 15s. to £11 6s. per ton according to percentage of constituents.

Nitrogen Phosphate Fertilisers.—£10 5s. to £13 15s. per ton according to percentage of constieuents.

Latest Oil Prices

London, May 9.—**Linseed Oil** was very firm. Spot, £22 5s. (small quantities 30s. extra); May, £20 17s. 6d.; May-Aug., £21; Sept.-Dec., £21 7s. 6d.; Jan.-April, £21 10s., naked. **Rape Oil** was firm. Crude, extracted, £26; technical refined, £27 10s., naked, ex wharf. **Cotton Oil** was firmer. Egyptian crude, £13; refined common edible, £16; deodorised, £17 10s., naked, ex mill (small lots 30s. extra). **Turpentine** was quiet. American, spot, 47s. 9d. per cwt.

Hull.—**Linseed Oil.**—Spot quoted £20 17s. 6d.; May, £21; May-Aug., £21 2s. 6d.; Sept.-Dec., £21 10s., naked. **Cotton Oil.**—Egyptian crude, spot, £13; edible, refined, spot, £15; technical, spot, £15; deodorised, £17, naked. **Palm Kernel Oil.**—Crude, f.m.q. spot, £15, naked. **Groundnut Oil.**—Extracted, spot, £18 10s.; deodorised, £22 10s. **Rape Oil.**—Extracted, spot, £25; refined, £26 10s. **Soya Oil.**—Extracted, spot, £16; deodorised, £19 per ton. **Cod Oil.** 25s. per cwt. **Castor Oil.**—Pharmaceutical, 35s.; first, 30s.; second, 27s. per cwt. **Turpentine.**—American, spot, 49s. 9d. per cwt.

Inventions in the Chemical Industry

Patent Specifications and Applications

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Specifications Accepted with Dates of Application

POLYHYDROXYCARBOXYLIC ACIDS derived from polyadoses, manufacture of salt.—Chemical Works, formerly Sandoz. Oct. 22, 1932. 408,987.

OXYETHYLATED (β GR-DIOXYPROPYL)-AMINOBENZENES, manufacture.—I. G. Farbenindustrie. Dec. 24, 1932. 409,237.

OXYETHYLATED (GR-ALKOXY-β-OXYPROPYL)-AMINOBENZENES, manufacture.—I. G. Farbenindustrie. Feb. 15, 1933. 409,238.

MATERIALS CONTAINING ETHANOL, manufacture.—Dr. L. Lilienfeld. July 15, 1932. 409,018.

DEHYDROGENATION of hydrocarbons.—J. Y. Johnson (I. G. Farbenindustrie). Sept. 22, 1932. 409,312.

REMOVING COLLOIDAL SUBSTANCES from liquids of vegetable or animal origin, process.—Dr. J. Dedek and Dr. J. Vasatko. Sept. 25, 1931. 409,332.

HYDRATED LIME, production.—L. G. Sewell, F. P. Stowell and Imperial Chemical Industries, Ltd. Sept. 27, 1932. 409,314.

REDUCING THE LUSTRE of cellulose ester and ether materials.—British Celanese, Ltd., G. H. Ellis and E. W. Kirk. Oct. 19, 1932. 409,275 and 409,277.

HIGH-QUALITY ASPHALTS, manufacture and production.—J. Y. Johnson (I. G. Farbenindustrie). Oct. 20, 1932. 409,278.

STRIPPING DYEINGS prepared with vat dyestuffs.—J. Y. Johnson (I. G. Farbenindustrie). Oct. 22, 1932. 409,336.

RED CHROMATE PIGMENTS, manufacture and production.—J. Y. Johnson (I. G. Farbenindustrie). Oct. 28, 1932. 409,349.

UNSULPHONATED INDOLE COMPOUNDS, manufacture.—I. G. Farbenindustrie. Oct. 31, 1931. 409,350.

STABILISATION OF AQUEOUS SOLUTIONS containing hydrogen peroxide.—Roessler and Hasslacher Chemical Co. Nov. 2, 1931. 409,361.

WATERPROOFING COMPOSITIONS and their applications.—E. I. du Pont de Nemours and Co. Nov. 6, 1931. 409,362.

SYNTHETIC RESINS from phenols and aldehydes, production.—Dr. K. Albert Ges. Chemische Fabriken. Nov. 7, 1931. 409,397.

VARNISHES, LACQUERS, PAINTS, and like surface-coating compositions, manufacture.—Standard Oil Development Co. Dec. 29, 1931. 409,423.

COLOURING RUBBER.—J. Y. Johnson (I. G. Farbenindustrie). Dec. 23, 1932. 409,451.

RESINOUS CONDENSATION PRODUCTS, process for making.—Dr. A. Spitzer. March 12, 1932. 409,490.

DYESTUFFS, manufacture.—I. G. Farbenindustrie. May 11, 1932. 409,512.

PHOSPHATE-BEARING MATERIALS, processes of concentrating.—Phosphate Recovery Corporation.—June 2, 1932. 409,514.

DELUSTRED RAYON, manufacture and production.—Viscose Co. Sept. 20, 1932. 409,521.

VEGETABLE LECITHIN, production of stable water-containing emulsions.—Dr. F. W. Engelmann, M. J. Brinckman, A. Mergell, A. Brinckman, and F. Mergell (trading as Harburger Oelwerke Brinckman und Mergell). July 26, 1933. 409,540.

SYNTHETIC MASSES, manufacture.—Dr. P. Meyersberg and Dr. G. Wolf. Oct. 19, 1932. 409,542.

PURE ALUMINIUM-SILICON ALLOY, production.—Metallges A.-G. Oct. 7, 1932. 409,572.

WHITE CLOUDED ENAMEL and glazes, production.—I. Kreidl. Nov. 28, 1932. 409,597.

COMPOUNDS suitable for use as wetting, cleansing, emulsifying, and bleaching agents, process for the manufacture.—H. T. Böhme A.-G. Dec. 28, 1932. 409,598.

2-NITRODIPHENYL, manufacture.—I. G. Farbenindustrie. Dec. 24, 1932. 409,615.

DELUSTRED RAYON, manufacture and production.—Viscose Co. March 11, 1933. 409,625.

STARCH, treatment.—Deutsche Hydrierwerke A.-G. Dec. 15, 1932. 409,627.

Complete Specifications Open to Public Inspection

FLUORINE, production.—E. I. du Pont de Nemours and Co. Oct. 31, 1932. 11842/33.

THERMOPLASTIC COMPOSITIONS.—Norddeutsche Seekabelwerke Akt.-Ges. Oct. 24, 1932. 24036/33.

RECOVERING TIN, lead, antimony, or bismuth or alloys thereof from substances which contain same and which may also contain more volatile metals, such as arsenic, cadmium, and zinc, process. Berzelius Metallhütten Ges. Oct. 24, 1932. 26489/33

SUBSTANCES CONTAINING VANADIUM, processes for working up.—Otavi Minen-und Eisenbahn-Ges. Oct. 28, 1932. 28330/33.

PROPELLENT EXPLOSIVES, production.—E. I. du Pont de Nemours and Co. Oct. 27, 1932. 29071/33.

TITANIUM PIGMENTS, production.—Titan Co., Inc. Oct. 28, 1932. 29135-7/33.

ADHESIVES, manufacture.—Deutsche Hydrierwerke Akt.-Ges. Oct. 24, 1932. 29479/33.

STABILISATION of aqueous formaldehyde solutions.—E. I. du Pont de Nemours and Co. Oct. 24, 1932. 29491/33.

LIQUID ANTHELMITICS, manufacture of solutions.—I. G. Farbenindustrie. Oct. 25, 1932. 29570/33.

PRESERVATION OF RUBBER.—E. I. du Pont de Nemours and Co. Oct. 25, 1932. 29631/33.

HYDRATED SODIUM METASILICATE, production.—Grasselli Chemical Co. Oct. 25, 1932. 29632/33.

HYDRATED BASIC SODIUM METASILICATE, production.—Grasselli Chemical Co. Oct. 25, 1932. 29634/33.

PYRIDINE COMPOUNDS, manufacture.—Chemische Fabrik von Heyden Akt.-Ges. Oct. 28, 1932. 29720/33.

FOLLICLE HORMONES, method for the production of hydrogenation products.—Schering-Kahlbaum Akt.-Ges. Oct. 27, 1932. 29784/33.

FOLLICLE HORMONE HYDRATES, method of producing.—Schering-Kahlbaum Akt.-Ges. Oct. 27, 1932. 29785/33.

GERMINAL GLAND HORMONE DERIVATIVES, process for the manufacture.—Schering-Kahlbaum Akt.-Ges. Oct. 27, 1932. 29787/33.

FOLLICLE HORMONES, manufacture of hydrogenation products. Schering-Kahlbaum Akt.-Ges. Oct. 27, 1932. 29790/33.

AROMATIC AMINES, manufacture.—E. I. du Pont de Nemours and Co. Oct. 26, 1932. 29798/33.

AROMATIC AMINES, apparatus for the manufacture.—E. I. du Pont de Nemours and Co. Oct. 26, 1932. 29799/33.

COLOURING OF WAXES.—E. I. du Pont de Nemours and Co. Oct. 28, 1932. 30066/33.

GASEOUS HYDROGEN under pressure and of acid silicate of soda, manufacture.—G. F. Jaubet. Oct. 29, 1932. 30139/33.

Applications for Patents

BENZINES, production.—International Hydrogenation Patents Co., Ltd. April 24. (Germany, May 5, '33.) 12282, 12283.

VENYL DERIVATIVES, production.—Kodak, Ltd. April 19. (France(April 19, '33.) 11882.

CHLORINATION OF HYDROCARBONS.—L. A. Levy and D. W. West. April 24. 12295.

FIRE-EXTINGUISHING FOAM, production.—Merryweather and Sons, Ltd., L. C. Miller and J. H. Osborne. April 23. 12198.

REFINING relatively low-boiling cracked hydrocarbons.—A. L. Mond and Universal Oil Products Co. April 19. 11820.

LACQUER VARNISHES, manufacture.—R. S. Morrell and H. Samuels. April 20. 11895.

CONVERTING UNSATURATED ALCOHOLS into corresponding carbonyl compounds.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. April 24. (United States, May 8, '33.) 12360.

CHROMIFEROUS DYESTUFFS, manufacture.—Soc. of Chemical Industry in Basle. April 19. (Switzerland, April 21, '33.) 11829.

DYEING LEATHER.—Soc. of Chemical Industry in Basle. April 20. (Switzerland, April 22, '33.) 11966.

LOW TEMPERATURE CARBONISATION of coal, etc.—C. B. Winzer. April 23. 12213.

PROCESS for making anhydrous citric acid.—E. Aeckerle, and Chemische Fabrik J. A. Benckiser Ges. May 1. 13145.

CONDENSATION PRODUCTS, manufacture.—C. Arnold and I. F. Laucks, Inc. May 2. 13276.

REFRACTORY MAGNESIA PRODUCTS, manufacture.—C. Arnold and Non-Metallic Minerals, Inc. April 27. 12827.

GLUCOSIDES, preparation of.—H. T. Böhme A.-G. April 30. (Germany, June 3, '33). 12975.

REGENERATED CELLULOSE, manufacture.—A. Carpmael and I. G. Farbenindustrie. April 26. 12668.

REGENERATED CELLULOSE, manufacture. A. Carpmael, and I. G. Farbenindustrie. April 27. 12831.

AZO DYESTUFFS, manufacture. A. Carpmael, and I. G. Farbenindustrie. April 28. 12892.

POTASSIUM SULPHATE, production.—A. E. Cashmore, I. L. Clifford, and Imperial Chemical Industries, Ltd. May 2. 13304.

ALLOYS.—Climax Molybdenum Co. May 2. (United States, May 19, '33). 13257.

VOLATILE METALS, production.—H. E. Coley. April 28. 12882.

BUTYL ALCOHOL, production. Commercial Solvents Corporation. April 27. (United States, June 12, '33). 12763, 12764.

From Week to Week

CROYDON MOULDRITE, LTD., which is controlled by Imperial Chemical Industries, has changed its name to Mouldrite, Ltd.

MR. JOHN MCGREGOR, a director of Robert Pullar and Sons, Ltd., Keirfield Dyeworks, Bridge of Allen, has died in a Stirling nursing home, aged 72 years.

MR. K. S. MURRAY, who has retired from the British Oxygen Co., Ltd., after 40 years' service, is to have his portrait painted for the board room of the company.

SIR CHRISTOPHER CLAYTON has been invited to accept the office of president of the Widnes Chamber of Commerce in succession to the late Sir Max Muspratt.

THE PRINCE OF WALES paid a surprise visit to the headquarters of Imperial Chemical Industries, Ltd., at Millbank, London, on May 4, and spent three quarters of an hour inspecting the various departments.

EUROPEAN MANUFACTURERS OF DYESTUFFS have recently held discussions with the Chemischer Verein, of Aussig, Czechoslovakia, with the object of developing the commercial relations with that combine.

REFERRING TO THE ARTICLE on "All-Glass Buchner Funnels," which appeared in THE CHEMICAL AGE, April 28, page 362, we would inform our readers that these funnels are manufactured by Jena Glasswerk Schott and Gen.

AT A MEETING of the board of the Institute of Physics held on May 8, the following were elected to membership: Fellows, W. I. Place, J. S. Preston and E. H. Wallace; associates, D. B. Boohariwalla, A. J. Davies, D. E. H. Jones, W. S. Sinclair, and M. Sterne; student, I. B. Mason.

THE PRESIDENTIAL ADDRESS of the Institute of Physics on "Physics and Science Museums," is to be delivered by Sir Henry G. Lyons, D.Sc., Sc.D., F.Inst.P., F.R.S., at the Royal Institution, Albemarle Street, W.1, on Tuesday, May 15, at 5.15 p.m.

UNDER A SCHEME OF REORGANISATION at the T. Robinson branch, Hope Works, Ramsbottom, of the Bradford Dyers' Association, about 90 employees are to be displaced. The firm has hitherto been engaged in cotton and silk finishing, and the works are now to be devoted to silk finishing only.

GERMANY'S EXPORTS OF DYESTUFFS in the first quarter of this year amounted in value to Rm.54,140,000, against Rm.51,290,000 in the corresponding period of 1933. Imports increased from Rm.3,750,000 to Rm.4,710,000. Exports of aniline dyes to Great Britain advanced from 246 tons to 329 tons, and those to British India from 318 tons to 664 tons.

MR. H. L. SETCHELL, the British Trade Commissioner at Melbourne, is at present in this country on an official visit. Mr. Setchell will be available at the Department of Overseas Trade for the period May 23-30 for the purpose of interviewing manufacturers and merchants interested in the export of United Kingdom goods to Australia, after which Mr. Setchell will visit a number of industrial centres in the provinces. Firms desiring an interview with Mr. Setchell in London or information regarding his arrangements to visit provincial centres should apply to the Department of Overseas Trade, 35 Old Queen Street, London, S.W.1, quoting the reference 12024/1934.

REPRESENTATIONS HAVE BEEN MADE to the Board of Trade under Section 10 (5) of the Finance Act, 1926, for the exemption of iso-butyl-amino-benzoate from Key Industry Duty under Section 1 of the Safeguarding of Industries Act, 1921, as amended by the 1926 Act. The ground of the representations is that the product is not made, and is not likely to be made, in any of the British Dominions in substantial quantities, having regard to the requirements of the United Kingdom. Communications on the subject should be addressed to the Principal Assistant Secretary, Industries and Manufactures Department, Board of Trade, Great George Street, S.W.1, not later than June 3.

NEGOTIATIONS HAVE BEEN COMPLETED for the formation of a limited company, with a capital of £1,000,000, to build plants in various parts of the country for the production of motor spirit from British coal. It is to be known as the National Coke and Oil Co., Ltd., and its twenty plants are to be at Belvedere, near London, Leeds, Edinburgh, Glasgow, Newcastle, Manchester and Cardiff. This will be the culmination of between three and four years' extensive experimental and research work with a comparatively small plant on the Cannock Chase coalfield, where, by a process exclusive to the new company, motor spirit has been produced from coal and marketed since last September at the rate of 1,000 gallons a day. Excepting Imperial Chemical Industries at Billingham, and various tar distilling companies, the Cannock plant has been the only place in the country where spirit has been synthetically produced from ordinary coal.

A DEWPOINT APPARATUS supplied by Casella and Co., Ltd., was shown as Fig. 4 in THE CHEMICAL AGE, April 28, page 382, in error for the humatograph mentioned.

AFTER BEING CLOSED FOR THREE YEARS the Tharsis Copper and Sulphur Works, Hebburn-on-Tyne, have been partially reopened, and 90 men have been started.

ATHOLE G. ALLEN (STOCKTON), LTD., of Stockton-on-Tees Chemical Works, have taken over that part of the business of Athole G. Allen and Co., carried on at Stockton-on-Tees. The business will be carried on by the same management as before.

APPLICATIONS FOR LICENCES under the Dyestuffs (Import Regulation) Act, 1920, during April totalled 738, of which 684 were from merchants or importers. To these should be added seven cases outstanding on March 31, making a total of 745. The Dyestuffs Advisory Licensing Committee granted 730 licences and referred 15 applications to British makers of similar products, leaving no cases outstanding on April 30.

DR. WALTER ROSENHAIN, late superintendent of the Metallurgical Department of the National Physical Laboratory, left estate to the value of £9,185 (net personalty £6,926). He requested his wife (or daughter Peggy) to give his set of volumes of the Journal of the Institute of Metals and of the Iron and Steel Institute and his special metallurgical Rosenhain Microscope to the University of Melbourne for the use of its Metallurgy Department, and to offer his other technical books to the library of the Metallurgy Department of the National Physical Laboratory at Teddington.

Company News

Park Gate Iron and Steel Co.—The directors recommend a dividend of 2 per cent., less tax, for the year ended March 31 last, after writing off £35,000 for depreciation and placing £10,000 to reserve.

Nitrate Railways Co.—It is announced that the directors have decided to make no payment on the ordinary, preferred ordinary, or deferred ordinary shares. No dividends have been paid since 1930.

National Drug and Chemical Co., Canada.—The net revenue for the year to January 31, 1934, before depreciation and bad debts, amounted to $39,032, in comparison with a loss of $35,459 in the previous period.

Goodlass Wall and Lead Industries.—A net profit of £175,953 is reported for the year 1933, compared with £143,495 in 1932. The sum of £10,000 is appropriated for the creation of a staff pension fund, and the ordinary dividend is raised from 3 per cent. to 5 per cent., less tax. The carry-forward is raised from £52,299 to £76,394.

Boots Pure Drug Co.—The directors announce that, subject to final audit, the net profit for the year ended March 31, 1934, amounts to £744,866, against £701,454 for 1932-33 and is the highest level since 1928-29. In addition to the four interim dividends already paid, amounting to 24 per cent., less tax, the directors recommend a bonus of 5 per cent., tax free. The directors have also decided to offer as rights to all ordinary shareholders on the register on May 3 one ordinary share at 15s. for every 16 ordinary shares held, such shares to rank pari passu with existing ordinaries, but ex the bonus referred to above.

British Match Corporation, Ltd.—The accounts show that net revenue from shares in subsidiaries rose from £437,576 in 1932-33 to £448,850 in the year ended April 30 last, the net profit rising from £418,633 to £433,217. The dividend for the year on the ordinary shares is unchanged, a final payment of 4 per cent., free of tax, now being proposed, making 6 per cent., free of tax, for the year. It is also proposed to write £40,000, as last year, off goodwill, rights, etc. (which will reduce that item to £560,000), while the balance forward, which was reduced last year from £54,186 to £39,379, is now only a few hundred pounds lower at £38,768. The balance-sheet shows that further shares were acquired in subsidiaries during the year costing £78,275, increasing the total shareholdings in subsidiaries to £6,121,759. The amount owing by a subsidiary is shown at £105,434, while £25,012 is owing to a subsidiary. Government securities and cash total £462,852, against creditors and dividend requirements amounting to £273,825.

Books Received

Organic Syntheses. Vol. XIV. London: Chapman & Hall. Pp. 100. 10s. 6d.

Laboratory Manual of Colloid Chemistry. By Harry N. Holmes. London: Chapman and Hall. Pp. 230. 20s.

Forthcoming Events

May 15.—Institute of Physics. "Physics and Science Museums." Sir Henry G. Lyons. 5.15 p.m. 21 Albemarle Street, London.
May 16.—Electrodepositors' Technical Society. "The Electrodeposition of Rubber." Dr. D. F. Twiss. 8.15 p.m. Northampton Polytechnic Institute, St. John Street, Clerkenwell, London.
May 16.—Society of Glass Technology. 2 p.m. London.
May 17.—The Chemical Society. Ordinary scientific meeting. 8 p.m. Burlington House, Piccadilly, London.
May 18.—The Bedson Club. 26th Bedson Lecture. "Gutta Percha, Balata, and Caoutchouc." G. G. Henderson. 6.30 p.m. Armstrong College, Newcastle-on-Tyne.

New Chemical Trade Marks

Compiled from official sources by Gee and Co., patent and trade mark agents, Staple House, 51 and 52 Chancery Lane, London, W.C.2.

Opposition to the registration of the following trade marks can be lodged up to May 25, 1934

Derkos. 543,251. Class 1. Pigments. Oliver Wilkins and Co., Ltd., 83 Siddals Road, Derby. July 21, 1933.

Peak. 545,483. Class 1. Calcium carbide. R. Hostombe, 2 Regent Street, Sheffield. October 18, 1933.

Nisoro. 547,027. Class 1. Abietic acid for use in manufactures. Dussek Bros., and Co., Ltd., 14 Verney Road, London, S.E.16. December 13, 1933. 547,028. Class 4. Resin, rosin and rosin oils for use in manufactures and not included in other classes.

Cloriston. 548,005. Class 2. Chemical substances used for agricultural, horticultural, veterinary, and sanitary purposes. Imperial Chemical Industries, Ltd., Imperial Chemical House, Millbank, London, S.W.1. February 23, 1934.

Opposition to the registration of the following trade marks can be lodged up to June 2, 1934

Impregnol. 545,372. Class 1. Chemical substances used in manufactures for waterproofing textile materials, paper and leather. Chemische Fabrik Pfersee, Gesellschaft Mit Beschrankter Haftung, Färberstrasse 4, Augsburg, Germany. October 16, 1933.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

Belgium.—An agent of French nationality established at Brussels wishes to obtain the representation, on a commission basis, of United Kingdom manufacturers of pharmaceutical specialities. Correspondence should be in French. (Ref. No. 499.)

Belgium.—A representative, wholesale dealer and merchant established at Brussels wishes to obtain the representation, on terms to be arranged, of United Kingdom manufacturers of special machinery or special tools for use in paper mills, artificial silk mills, power stations, chemical works, breweries and sugar factories. (Ref. No. 501.)

Belgium, Grand Duchy of Luxemburg and Belgian Congo.—A wholesale firm of manufacturers and agents established at Liége wish to obtain the representation, on own account basis, of United Kingdom manufacturers of asbestos products, including packings and jointings; industrial rubber goods, and insulators. (Ref. No. 503.)

France.—A firm of agents established at Paris wishes to obtain the representation, on a commission basis, of United Kingdom exporters of satin pulp and china clay for making couched paper. (Ref. No. 504.)